First Copy

A National Newspaper for Every Branch of the Industry

Automotive Daily News

★CARS★ SHOP EQUIPMENT TRUCKS ★★AVIATION★★ PARTS ACCESSORIES ★TIRES★

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A. J. SCAIFE, WHITE MOTORS, NEW PRESIDENT OF S. A. E.

Vice-Presidential Nominations Include Stout, Lawrence, Poole, Bachman, Roos, Noorken, McArthur and Padgett

WHITE SULPHUR SPRINGS, W. Va., June 18.—Announcement was made last night at the summer meeting of the Society of Automotive Engineers in session here of the nomination of Arthur J. Scaife, the White Motor Car Company, Cleveland, O., as president for the 1932-33 term.

Other officers nominated: Vice-president, representing aircraft engineering, William D. Stout, Stout Engineering Laboratories, Dearborn Mich.; vice-president, representing aircraft engineering, Charles L. Lawrence, president Lawrence Engineering and Research Corporation, New York; vice-president, representing Diesel engine engineering, Alfred J. Poole, United American Bosch Corporation, New York; vice-president, representing motor truck and motor coach engineering, B. B Bachman, Auto Car Company, Ardmore, Pa.; vice-president, representing passenger car engineering, D. G Roos, chief engineer Studebaker Engineering Corporation, South Bend, Ind.; vice-president, representing passenger car body engineering, Adrian J. Noorken, Hupp Motor Car Corporation, Detroit, Mich.; vice-president, representing transportation and maintenance engineering, A. S. McArthur, general superintendent Toronto Transportation Commission, Toronto, Canada; vice-president, representing production engineering, J. E. Padgett, Spicer Manufacturing Company, Toledo, O.

The three new councilors will be: H. T. Woolson, chief engineer Chrysler Corporation; R. D. Wilson, member board of directors of

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ROAD BUILDERS HOLD TRANSPORT SURVEYS ECONOMY GUARANTEE

WASHINGTON, June 18.—A master plan of highway administration based on transportation surveys that lead to economy is proposed by the American Road Builders' Association. ' The details of the plan are given in the report of the finance committee, T. H. Cutler, state highway engineer of Missouri, chairman.

Transportation surveys embracing the entire state mileage should be made, the report states, including studies of population trends, economic conditions, and the needs of a continuous highway system. Highway administration should be by state, county or consolidated county districts, and city, it is held. If state funds are allotted to counties and cities, the distribution should be based on transportation surveys and a connected system of highways built first.

Street and highway administration should be simplified by consolidation of governing bodies where

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Late News Flashes

New York, June 18.—At least five big companies have entered bids for the bus equipment that the B. M. T. will require for its bus lines in Brooklyn. The bidding is for 200 buses, contracts for which will probably be awarded in lots of 100. This is understood to be just a preliminary order, with further equipment needed as the bus system expands.

* * *

St. Louis, Mo., June 18.—The Gardner Motor Company announces that a distribution of 25 cents a share in cash and one share of Detroit Aircraft Corporation for each ten shares of Gardner stock has been approved by the stockholders and will be effected.

* * *

New York, June 18.—Retail business in some parts of the country actually exceeds volume at this time last year, while in others it has dropped as low as 75 per cent. of the 1930 total, average for the country showing a recession of 15 per cent. This information was compiled by reports to National Retail Credit Association.

* * *

Detroit, June 18.—The appointment of H. M. Hamilton as manager of retail sales promotion, F. C. Himmelman as manager of wholesale sales promotion and the connection of R. M. Walker with the advertising department of Chrysler Sales Corporation in charge of the production of all advertising literature, is announced today by J. W. Frazer, general sales manager.

Spirited S. A. E. Discussions Center Around Rear Engine Mountings and Synthetic Oils

Engine in Rear of Car Would Permit the Feature of Streamlining as Proposed in Tear Drop Cars As Presented by W. T. Fishleigh

WHITE SULPHUR SPRINGS, W. Va., June 18.—Engines in the rear and the possibilities of the development of this type of car in the near future were discussed at length here last night following the presentation of a paper by Herbert Chase outlining some of its advantages in design and streamlining.

This idea is certainly interesting and members in session here and some engineers have declared that a car of this type will soon be available. The engine in the rear car would permit the feature of streamlining as proposed in the tear drop cars discussed by W. T. Fishleigh Tuesday evening.

The discussion of Mr. Chase's paper last evening brought out the following ideas:—

That there will be some objections to this type of vehicle cannot, of course, be denied. It will be of interest, however, to see whether these are engineering objections to the type of structure suggested or whether they are not, after all, more likely to be merely sales arguments in favor of the present vehicle and against anything "radical."

A rear engined car can, undoubtedly, be made much more compact, and with a certain amount of care in arrangement of parts the power plant should be fully as, if not more, accessible than in the present job. This applies particularly to those underfloor parts like the gear box. Also a body form which has a lower air resistance than the present type would be readily available, and many figures are available which indicate the effect of streamlining upon power requirements.

The one serious objection to the

(Continued on Page 2)

QUEBEC'S FIRST TRUCK OFF PRODUCTION LINE AT NEW WHITE PLANT

MONTREAL, June 18.—The first motor truck to be manufactured in the province of Quebec came off the production line at the White Company, Ltd., 5225 De Gaspe St., on Saturday afternoon, the event being witnessed by L. M. Hart, vice-president, and other officials of the company. A handsome 2½-ton White truck chassis, motored by a powerful six-cylinder engine, Quebec's first "home-made" truck, was one worthy of the province.

The erection of a Canadian plant of the White Company here marks entry into Canadian production field of an organization which has been supplying trucks to this country for twenty-two years. In the past, White trucks used in Canada were built at the main factory in the United States, and the Montreal office was merely a branch. Falling in line with present day conditions, however, the officials of the company decided upon building their trucks in Canada as well, and the completion of the machine marks the realization of this decision.

Among others present at the event were P. S. Richardson, branch manager, and Vernon King, who is in charge of production, and all stated that the first production of the new plant was eminently satisfactory.

FORD OFFERS TWO NEW BODY MODELS

Detroit, June 18.—The Ford Motor Company today announced two new body models of the Model A line. A convertible sedan is now available at a price of $649, and a cabriolet is also offered at $595.

During the past few months three other five-passenger models have been announced, making five additions to the line in that period.

FORD'S DETROIT OUTLAY IN 1930, $374,000,000

Detroit, June 18.—Ford Motor Company announces that in the Detroit metropolitan area in 1930 its total expenditures amounted to approximately $374,000,000. Of this amount nearly $210,000,000 was spent for materials, supplies, construction and miscellaneous services purchased from more than 450 Detroit concerns.

The company paid $150,000,000 in salaries and wages, and in addition more than $5,000,000 in taxes and special assessment levies. Then, too, counting the Ford investment funds for employees, there was more than $1,500,000 in interest paid out in this section to the employees.

DAILY S.A.E. PROVES ONE OF MEETING'S BRIGHTEST SPOTS

WHITE SULPHUR SPRINGS, June 18.—One of the features of this year's summer meeting in this mountain ringed resort has been the appearance each morning of the Daily SAE, produced this year by the Edward G. Budd Manufacturing Company and Budd Wheel Company. H. A. Coward has acted as publisher and Griscom Bettle as editor, with a noble staff of reporters and make-up men sweating in the background. Just how frenzied an existence these editors and publishers led during the week in getting together their material and then carrying it weary miles to the print shop and back before breakfast only they will ever know.

The Daily SAE this year was a bright, humorous, newsy sheet that kept the engineers chuckling over the breakfast table, thereby promoting digestion and contributing to the brilliancy of thought that was apparent during the technical sessions.

The consensus of opinion among the several hundred engineers here

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White Sulphur Favored for Further Summer Meetings

WHITE SULPHUR SPRINGS, W. Va., June 18.—Tomorrow will mark the close of one of the liveliest and most interesting summer meetings in the history of the Society of Automotive Engineers which has been in progress at the Greenbrier Hotel here since last Sunday. Weather has been ideal all throughout the convention, and members are agreed that the motion to make the Greenbrier the standard summer meeting place of the society should be carried unanimously.

It is felt that the accessibility of White Sulphur to the leading auto manufacturing centers, and the fact that here all members can be accommodated under one roof are advantages.

The aircraft demonstration this afternoon was the leading feature of the out-of-door entertainment, as the golf tournament closed yesterday, with R. F. Jones of the Russell Manufacturing Company being enthroned as 1931 champion of the S. A. E. nosing out Joe Shea of the Firestone Tire and Rubber Company. Jones' score was 156, against Shea's 159. Gordon Brown won the "A" flight with a score of 143, and the runner-up was A. C. Chambers of Bendix with 144.

In "B" flight R. F. Steeneck of Fafnir came in with a score of 137, and H. A. Hansen, Bendix Stromberg, turned in 137, to tie Steeneck. C. L. Hall, United Carr Fastener, was runner-up with 138. F. C. Horner, General Motors, won the "C" flight with 133, and the runner-up was H. L. Ames, Whitney Manufacturing Company, with 145.

Mrs. Stanley Whiteworth, chair-

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Combative Spirit, Sporting Feeling Needed in Salesmen

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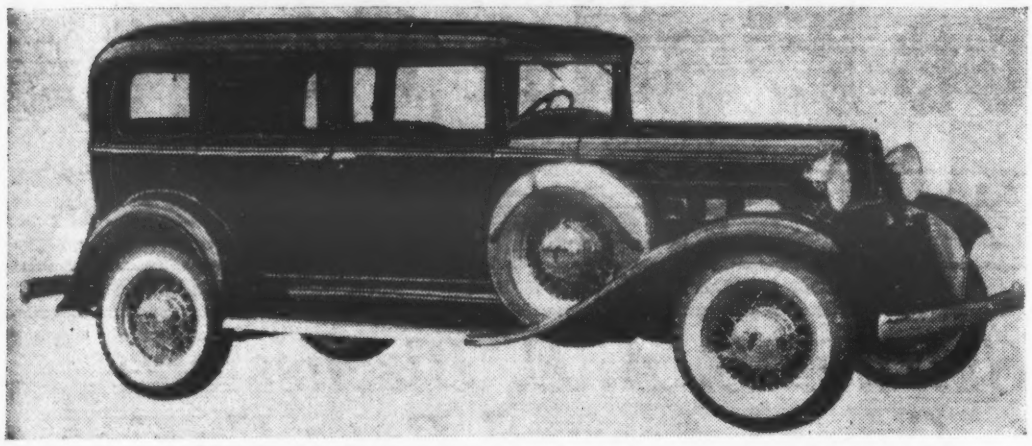
New Willys-Knight Custom Sedan



THE NEW WILLYS-KNIGHT CUSTOM SEDAN, announced in yesterday's issue of Automotive Daily News, is shown above. The body is mounted on a chassis with a wheel base of 121 inches

Rear Engine Cars, Synthetic Oils Feature S.A.E. Session

(Continued from Page 1)

suggested type of car that comes to mind is the matter of weight distribution. Particularly if an integral frame — and — body construction is used, the vehicle weight will be much reduced with the rear mounted engine. With engine and drive mounted at the rear, the major portion of the mechanism weight will be on the rear wheels, particularly if a construction is used which places the engine over the axle. If, further, a light frame and body is used, the front wheels will be relatively lightly loaded.

The question of tire wear is of some small importance; however, the question of really serious importance is that of road construction. What is going to happen to a seven passenger car with only the driver aboard, travelling fast on a bumpy road?

H. B. Chalmers: In commenting on Mr. Chase's paper I note that he states that a much better streamline form of the complete vehicle becomes possible with rear engine mounting. While it is true that rear engine mounting is capable of being streamlined, the present standard chassis can also be streamlined and has been streamlined with marked success. I refer to the car designed by Dr. Paul Jaray, whose performance, although the car has been in constant use for over two years, remains outstandingly superior to ordinary cars because of its aerodynamic design. The performance of this car was described in detail in a paper read by Mr. Marti, chief engineer of the American Brown Boveri Corporation, at a meeting of the Society of Automotive Engineers in New York city on February 18, 1931.

It was shown in this paper that the fuel consumption of the streamlined car was substantially less than that of the standard car even at compartively low speeds, such as thirty-two miles per hour. The standard car consumed 10.5 liters of gas on a measured course of 34.2 miles, whereas the streamline car consumed 6.5 liters, a saving of almost 40 per cent. at an average speed of thirty-two miles per hour. This emphasizes the value of streamlining at speeds that are in constant use over the roads of the country.

While expressed in terms of gasoline economy (these tests were conducted in Europe, where this element is an important factor), we must consider that this means that a lighter, smaller engine will give the same results as are obtained from the heavy, high powered motors used today, provided the car is streamlined.

There can be no question that streahlined cars with rear end engine design would give equally satisfactory results. One of the difficulties in the way of rear engine mounting design is the feeling on the part of the public that they are out in front and unprotected from accident. This objection will have to be met. In streamlining the rear engine mounting car I believe that the streamline should be carried well forward, as far as the present bumpers are placed, thus providing a very considerable space in front of the passengers and driver where spare tires and baggage would be stowed. The front of the streamline should and could easily be built so as to resist collision as effectively as the present bumpers, mudguards, radiators and lamps. Strut design similar to that used in airplane construction would weigh very little and protect the passenger, while bringing forward of the body would make him feel safe and decrease this psychological resistance to the change necessitated by rear engine mounting.

Thomas S. Kemble: An attempt some years ago to discover means for reducing discomforts of hot weather driving led me into a study of possibilities involved in this apparently radical departure. That study finally brought me to the conclusion that it would constitute a very logical means to radical improvements in several directions and some experimental results confirmed this conclusion and led to further study.

I concur most heartily in Mr. Chase's conviction that "the problems involved in perfecting a satisfactory arrangement of rear engine, gear set, differential and drive can be solved in such a way as to effect a marked improvement over conventional arrangements."

This location offers far greater possibilities for combined simplicity, compactness, and accessibility of the units so located, and at the same time it permits radical improvement in body arrangement for improved appearance, performance and comfort, together with greater economy of manufacture and operation.

Lowell H. Brown: While it is true that there are many theoretical advantages in rear engine mounting it must be admitted that such a change is a radical departure from present automobile design. It is not difficult to visulize the revolution which must take place in the manufacturer's plant and in the public's market to bring rear engine mounting up to mass production. There is little doubt that a complete rearrangement of the manufacturing plant would be necessary, that substantial investments in new dies and machinery would be required, entailing a loss in manufacturing equipment rendered obsolete by the new design and that the mind of the public, accustomed for many years to front engine mounting would perhaps be slow to accept the undisputed theoretical advantages of rear engine mounting.

Austin M. Wolf (New York City) (discussion Chase paper): "Mr. Chairman, members and guests: I think the first thing of primary importance with the rear engine mounting is to consider our center of gravity, and where our power application is in combination with this center point, going down along the road with possible variations of power output; instead of roaring to go, we may be raring to go as we go along.

"Presuming that the passengers are all in their seats, we can get a stable condition. Where we have the one passenger, the driver behind the wheel, he probably will not be evenly balanced, and we certainly do not want to resort to the Bernie stunt of putting the storage battery way up front with probably a two-inch compiles to go back and start the engine.

"About the accessibility of the combined unit, that will require a lot of desig nstudy in order that the combination of motor power and transmission parts will be such that you can really get at them.

"As to improvement in riding qualities, disregarding for the moment independent wheel suspension, the driver's seat is near the front axle, or nearer the front axle, and in the present car the driver is midway, so that he is less susceptible to the vertical movement when the car oscillates. The driver in this rear drive car, as we have seen most examples, will be bounced quite a bit.

"The accessability of the engine is claimed for this rear mounting. In the paper it is claimed that there will be no lack of it, and still there will be maintained stream-lining form. I think that Bernie shows that in order to get an accessible engine you have to depart quite a bit from the true stream-line, and I think that inaccessibility is increased with the true stream-line.

"About the driver sitting up front, there will be a new driving technique required, which probably is necessary anyway after we heard Mr. Hale last night. We know that we want to drive one of these twin coaches going around turns. We have to disregard a lot of our old ideas and learn over as to judging objects."

Future developments, G. L. McCain presiding.

Chairman McCain: "The two

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Lists of Fleet Owners

75 Owning 1000 or More
1000 Owning 100 or More
17000 Owning 10 or More
3300 Bus Fleet Operators

The Lists show in almost every case, the name of operating executive who controls or influences the automotive purchasing policies of the company.

Every large city has been divided into zones. Each page of the List covering a zone of the city is routed like a postman's route to make the salesman's time most effective.

Ask us how we keep YOUR list up-to-date and accurate throughout the year.

We quote on a separate list for any large city.

Let YOUR salesmen spend THEIR time talking to prospects, instead of looking for prospects to talk to.

FLEET OWNER LIST CO.
1817 Broadway, New York City

Classified Advertising

Classified Rates 5c Per Word

FOR SALE

De Soto Double Face Electric Sign including flasher. Sign 6½ feet wide and 12 feet long, in splendid condition; used about 2 years. Sign originally cost $750. Will consider any offer. Drawings furnished on request. Jarman Motors, Inc., 301 W. 29th St., Baltimore, Md.

SPARKS from DETROIT

The Tire Dollar

* * *

Chrysler Elephant Gone

* * *

Rockleman on Job

* * *

Chris Sinsabaugh—Detroit Editor

IN George Washington's time they were claiming that the Father of Our Country had thrown a silver dollar across the Potomac at Mount Vernon, but the modernized version always adds that a dollar went farther in those days than it does now. This, however, does not apply to tires of the present. Where it used to cost $18 per thousand miles in 1913, today you get the same distance for only 80 cents.

You don't have to take my word for it. My authority is L. M. Simpson, general sales manager of the United States Rubber Company's tire department. Tires today, he says, cost 45 per cent. less than they did in 1926, and at the same time give far greater mileage, while the cost of 550 other commodities is now 77 per cent. of what it was in 1926. Figures, he adds (nothing funny intended in that), compiled by the Labor Department of the United States government show that no other commodity has dropped as much in prices as have automobile tires.

* * *

WARMING to his work, Mr. Simpson goes on to say: "In the earlier days of motoring the matter of tires was an expensive proposition. Tires were costly, and the mileage they delivered was pitiably small compared with the service given by the standard tire of today. For example, in 1913 it cost the motorist approximately $55.80 for 3,000 tire miles. In 1921, tires had improved and the prices changed so that for $41.85 he got 8,000 tire miles, while this year he is certain of 15,000 miles at a cost of only $12.80."

His why for it is the improvement not ony of manufacture, but the product itself, and he points with pride to U. S.'s web cord process, in which the cords of the fabric are dipped in liquid latex. This congeals and impregnates the cords, keeping them at exactly the correct distance apart. As the cords do not touch, friction is eliminated and heating of the tire is prevented.

* * *

IN this column at show time was faithfully recorded the activities of the Chrysler papier mache elephant. Brutus was utilized for street parades during the various shows of the season and Chrysler got its advertising through crashing the front page when the Humane Society protested the exposure of the elephant, which it thought to be a live one, to the inclement wintry weather.

There is an aftermath to all this and it happened in Buffalo, they tell me. Here let me inject into the recital the fact that in mapping out the street parades it was necessary to route Brutus over thoroughfares where the overhead bridges and viaducts were sufficiently high to enable Brutus to go under safely. The Buffalo affair, which happened only recently, went off without a hitch and Roy Justice, Chrysler distributor in Buffalo, was so delighted with it that he decided to take the elephant home with him at lunch time to show to Mrs. Justice. Unfortunately, he forgot about a low bridge. Without thinking, he drove under it and Brutus was smashed to bits. There was no more Chrysler elephant.

* * *

DON LAWDER, manager of the automotive department of the ritzy New Yorker, agrees with C. C. Winningham, Hudson's advertising counsel, that the results of the American Boy questionnaire, duly recorded in this column, proved Winningham's point as to the youngsters' views on automobile race drivers as heroes. And he admits that the kids are even getting blase so far as airplanes are concerned.

"Even the drama of the airplane is being diminished," he writes the counselor. "When the 672 army planes came to New York a couple of weeks ago, I took my two boys, aged 12 and 13 years, to see them fly over Long Island Sound at Norwalk, Conn. Three days later, when they again flew within five miles of our house, on their way to Boston, I suggested taking the boys over to see the planes again, and they replied: 'We have seen them once. What's the use of seeing them again?'

"Perhaps nothing remains to stir the imagination of the boys today, except a voyage to the moon in a rocket, and even that, having been done once, would gradually fade into obscurity."

Right Kind of Personal Contact Found Essential

C. W. Fisher of Philadelphia Points to Right Methods in Car Sales; Believes in Hard Work And Constant Touch With Large Numbers of Persons

"THERE are only two things that will sell cars—hard work and constant touch with a lot of people." This from C. W. Fisher, retail manager for Harper & Harper, Hupmobile distributors, 1515 North Broad St., Philadelphia, Pa., who adds: "One of the biggest helps in selling new cars is the fairly recent assurance from most manufacturers that they will introduce no new models in the middle of the year. I know it has helped me."

The best plan leading to the active sale of new cars, according to Mr. Fisher, is to arouse a combative spirit, a sort of sporting feeling, among the members of the selling force to prompt them to go out and throw in their best efforts. He holds the viewpoint that it is necessary for the salesmen to do this today, as the car selling scene has completely changed from the days when the majority of stop-in visitors at the showrooms were not merely shoppers, but prospective customers.

As floor sales no longer suffice, it is up to the salesmen to find live prospects outside and bring them into the showroom if possible, as business psychology has shown it is easier to sell a real prospect in the salesman's place of business than it is in that of the prospect. The right kind of personal contact, then, and "lots of it," is regarded as the best method of getting sales results.

One fruitful plan of securing good leads is for the salesmen to canvass among garage owners' employees, paying a little bonus for information as to owners whose cars brought in for storage or service look rough enough to be approaching the trade-in stage, signifying a possible new car prospect.

"The first thing the salesman who has secured his prospect should do," said Mr. Fisher, "is to try to sell him transportation—the motor and the chassis supply that secondarily; comes appearance, where the prospect is a man. Our salesmen explain the features of free wheeling, so the prospect will understand it; create a good impression about it and follow up this impression. When a salesman locates a live prospect and has succeeded in interesting him in the car he gets him into the showroom, if he can, to buy before the prospect slips back into indecision and becomes a 'shopper-around.'"

It is contended that the man who has just purchased a new car is always an especially good source of new prospects' names, as his enthusiasm over his purchase is still hot, and he will readily give names and addresses of his friends who are in the market for a car, or who would likely become prospects. Mr. Fisher believes that the ordinary types of follow-up literature sent out by dealers in general are more effective in the case of service than of car sales. Direct-mail follow-up, Mr. Fisher thinks, becomes effective in the latter field only when used almost continuously.

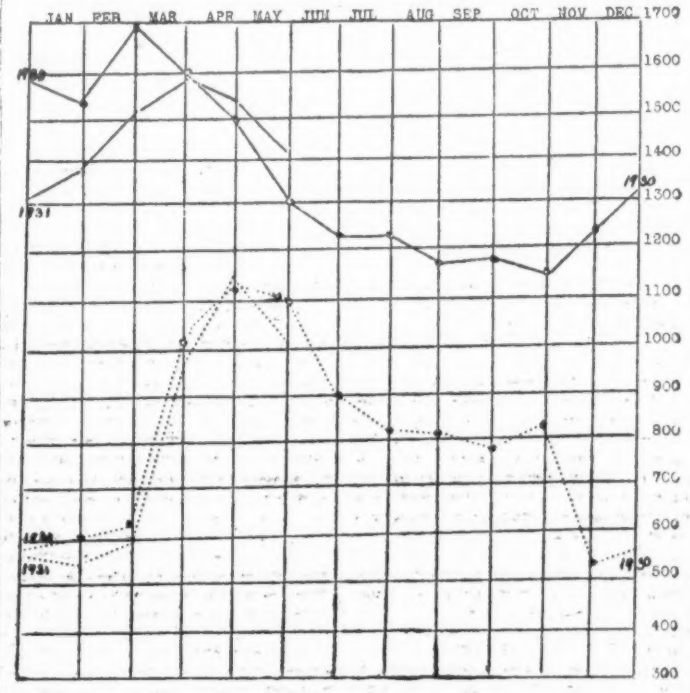
NEW YORK A. M. A. GOLF TOURNAMENT ON JUNE 23

New York, June 18.—Tuesday, June 23, the Gedney Farms Golf Club, White Plains, will be the scene of the third monthly golf tournament of the Automobile Merchants Association of New York, Inc.

In accordance with the usual custom, there will be a very choice selection of prizes for the winners at the close of the day's play.

C. H. Larson, chairman of the golf committee, has returned from an extended trip abroad, and will be given a welcome not only by the members of his committee, Fred J. Ryan, C. H. Jennings and A. G. Southworth, but by the other golfers of the association as well.

Used Car Stocks Decreasing In Newark, N.J., Report Shows



Used car stocks in Newark, N. J., are decreasing, as also are the sales, according to C. E. Holgate, manager of the Newark Automobile Trade Association.

"There has been a steady demand for good used cars, but the inclement weather of the past month undoubtedly cut down the demand. I look for a slight upturn during June," he says.

"Alvan Macauley, president of the National Automobile Chamber of Commerce at the annual meeting last week, pointed specifically to used car trading as being on a deplorable basis, asserting belief that in 90 per cent. of all sales made used cars are accepted at terms entailing substantial loss," Mr. Holgate continues. "He also placed the responsibility for the cure of this situation at the door of the factories. Dealers will make money just as soon as the factories insist that dealers take in used cars only on that basis that will insure a profit, instead of on the present basis of having the used cars eat up the profits of the new car department."

The above chart of used cars shows the trend of the Newark market in the first five months. It will be noted that on the whole 1931 has been a better used car year than 1930.

Used car stocks this year, while they touched the April 1, 1930, figure of 1,500, did not at any time reach the 1930 high of 1,700. Stocks on June 1 totaled approximately 1,400, or 100 units more than a year ago.

Used car sales, however, are indicated as much better than a year ago, as will be seen in the chart.

M'DARBY SEES AUBURN TOPPING MAY'S RECORD WITH SALES FOR JUNE

Cincinnati, June 18. — Expressing confidence that sales in June will top the record of May, N. E. McDarby, vice-president and general manager of the Auburn Automobile Company, drew applause from a large group of Auburn and Cord dealers and salesmen in the Cincinnati district, at a convention here.

Auburn produced 24,440 cars in the first five months of this year, as compared with 22,749 during the entire year 1929, McDarby said. In May, he said, production reached a high record with 6,717, but declared June figures, to date, assured an even greater output this month. The May production compared with 1,848 cars in the same month a year ago.

While the drop in output in the industry averages 30 per cent., Auburn has shown 100 per cent. monthly increase since January 1, McDarby said.

"Last November," he said, "our factory was almost closed. Thousands of idle men and their families were suffering. We took our employees into our confidence and, instead of playing safe and producing a small number of cars, with the factory working only four months, we found our men willing to work for a few cents less per hour on the chance of nine or twelve months' steady employment."

McDarby said fluctuations in Auburn stock in recent weeks had been due to stock manipulators. He flew here from the factory at Auburn, Ind., to address the convention.

JARMAN MOTORS GETS DODGE FOR BALTIMORE

Baltimore, June 18.—Jarman Motors, Inc., has been appointed by Dodge Brothers to succeed the Harter B. Hull Company as Dodge passenger car, Dodge truck and Plymouth representatives in Baltimore territory. Members of the new company are well known in the automobile field, having been connected with Dodge for many years under the Eastwick Motor Company and for the past four years the Harter B. Hull Company.

Gilbert A. Jarman is president of the new company; William A. Tower, Jr., vice-president; Charles E. Fountain, secretary and treasurer; William R. Carr, assistant secretary, and Albert C. Susemihl, assistant treasurer.

Headquarters of the new company will be at 301 West 29th St., where all sales and service will be handled as in the past.

LARGE FORD DRIVEAWAY FROM CANADIAN PLANT

Montreal, June 18.—The largest driveaway in several years from the Ford Motor Company of Canada, Ltd., took place recently when Toronto and Hamilton dealers and salesman took delivery of sixty-eight at the East Windsor plant, driving them overland to the two cities.

The Toronto and Hamilton group spent a day touring the Canadian Ford plants and the plants of the American Ford Company of Dearborn, Mich. They also viewed Ford airport and Henry Ford's historical Greenfield Village as guests of the Canadian company before returning home.

FAULKNER TELLS AUBURN CHICAGO STAFF PRESENT ERA TEST OF STRENGTH

Chicago, June 18.—"Out of the present period those businesses which have put their house in order will emerge stronger and better qualified to meet competition than ever before," R. H. Faulkner, president of Auburn, told 200 Auburn and Cord dealers and salesmen of the Chicago territory at a meeting and luncheon in the Hotel Stevens, Friday.

N. E. McDarby, vice-president in charge of sales, told how the additional values which Auburn is giving this year had brought the company sales in Cook county from nineteenth place for the first five months last year to fourth for the first five months of 1931.

McDarby is making a 35-day trip in a Stinson tri-motored plane visiting Auburn and Cord dealers and distributors in all the major cities. This annual trip previously took more than 100 days by train. The itinerary includes Pittsburgh, Philadelphia, New York, Boston, Washington, D. C.; Indianapolis, Chicago, Milwaukee, Minneapolis, St. Louis, Kansas City, Denver and points of the West Coast.

18 NEW WILLYS DEALERS IN PHILADELPHIA AREA

Philadelphia, June 18.—Herbert Brothers, Willys and Willys Knight distributors, 1409 North Broad St., has signed up eighteen new dealers, since the first of the year. Herbert Brothers' business the past month has been exceptionally good, owing largely to the popularity of the new spring color feature of the product.

CLASSIFIED ADVERTISEMENTS IN THE AUTOMOTIVE DAILY NEWS BRING RESULTS

MAY CHEVROLET SALES FOR MANSFIELD, OHIO, BEST SINCE NOVEMBER

MANSFIELD, O., June 18.—With the exception of one month since the first of the year, Chevrolet passenger car sales have led all other makes in the Greater Mansfield area. While many sections of eastern Ohio reported a falling off in Chevrolet sales during May sales here the past month were the heaviest since November, it was learned from a dealer survey.

Roy Swaney of Roy Swaney, Inc., largest Chevrolet dealer here, reported a total of thirty-seven new passenger cars sold by his firm during May, a new high for more than a year, as against twenty-six for April. "Our 1931 sales are ahead of those during the same period in 1930," Mr. Swaney said, "which is an indication that automobile buying in this part of the state is on the return to normal."

The used car situation in Mansfield is satisfactory, several dealers reported this week. Compared to a year ago, there is on hand only a normal stock for this season of the year, while last year at this time most every dealer had on hand quite a surplus of used cars. It is expected that a good percentage of the used cars on hand will have been absorbed within the next fifty or sixty days.

Service demand with the larger dealers has been spotty but satisfactory so far this year, they report. There are days when there is little call for service and then a period of activity develops which easily offsets the lull, dealers said.

Outlook for the remainder of the summer is highly satisfactory, it was declared. Dealers are of the opinion that the firm with its sales organization on its toes every day of the week will get the business.

"THE prices of the new Willys line are even lower than we dared to hope. These prices, combined with such style and engineering, make Willys cars the greatest values."

—The Plemmons Motor Co.,
Asheville, N. C.

Write or wire for franchise particulars

Willys-Overland, Inc., Toledo, O. Willys-Overland, Ltd., Toronto, Can.

WILLYS

A BIG SIX priced like a four
A POWERFUL EIGHT . . .
A BRILLIANT KNIGHT . . .
2 NEW WILLYS TRUCKS

Automotive Daily News

"Of, By and For the Entire Automotive Industry"

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AUTOMOTIVE DAILY NEWS PUBLISHING CORPORATION,
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ADVERTISING AND BUSINESS HEADQUARTERS

Harry A. Tarantous, Business Manager; 350 Hudson St., New York, N. Y.
George M. Slocum, Manager Detroit Bureau, 427-8 Fisher Building, Detroit, Mich. phone Empire 3500; Willard R. Cotton, Western Manager, 333 North Michigan Ave., Chicago, Ill., phone Central 5936; Metz B. Hayes, New England Manager, Little Building, Boston, Mass.; Blanchard, Nichols & Coleman, American National Bank Building, San Francisco, Cal.; Lincoln Building, Los Angeles, Cal.; 1037 Henry Building, Seattle Wash. Address All advertising and business correspondence to 350 Hudson St., New York City.

EDITORIAL DEPARTMENT

350 Hudson St., New York, N. Y. Telephone CA nal 6-1000
Alexander Johnston, Editor. William C. Callahan, News Editor.
Statistical Department (registrations and specifications), P. J. Robas, statistician. C. J. Alexander, sales analyst. Engineering Department, A. Benson Carleton, technical editor; J. Russell Walsh, engineering editor. Merchandising Department, Charles S. Zack, editor. Art Department, John Bauersfeld, director.
Detroit Bureau, Chris Sinsabaugh, editor, 427-8 Fisher Building, Detroit, Mich. Telephone Empire 3500. Contributing editor, John C. Weimore.

The Feminine Clutch

IT will probably be a tremendous surprise to the average man to know how important a share of American business is owned by women. According to a recent survey women now own 41 per cent. of the outstanding stock of American corporations. This is truly surprising in view of the large predominance of the male sex in business life.

In America business and most other activities are more definitely family matters than in most other countries. The American man is accustomed to make decisions relating to family affairs, after consultation with wife, sons and daughters.

This is particularly true of such an operation as the purchase of a new motor car. We do not doubt that in 90 per cent. of the purchases of automobiles, the entire family has been consulted and each member has had the privilege of airing his views on the various makes under consideration.

Both in advertising and in the design of his product, the automobile manufacturer who neglects to take into consideration this family phase of purchases in this country is omitting a factor that has a dominating influence on sales.

A Ford Diesel?

THERE appeared in several newspapers not far from New York the other day a story to the effect that Henry Ford was about to produce a new car, powered with an eight-cylinder Diesel engine. This story did not obtain very wide circulation, though it pretended to be based on information "bootlegged" out of the Edgewater assembly plant of the Ford Motor Company. Nevertheless, within two or three days after the appearance of the story, Automotive Daily News received frantic letters from a number of our dealer readers asking us if the story were true.

We regret to say that so far Henry Ford has failed to take us into his confidence. He has NOT assured us personally that he is not about to produce a Diesel-engined passenger car, but we feel reasonably sure none the less, that he is not going to do anything of the sort. We doubt also that Mr. Ford intends to bring out a steam car or an electric. We are willing to gamble also that he will not, within sixty days, produce a rotary engined combination of highway vehicle and motor boat.

It is quite possible that there is a Diesel engine in the Ford experimental laboratory. It may be that some day a Ford Model B or C or D will be driven by an injection type power plant, but we will risk a modest amount that this will not occur in 1931. The summer season is upon us and the generous beams of a warming sun invariably breed rumors. The period that lies just ahead of us has sometimes been called "the silly season." Suppose we let it go at that.

A 5,000,000 Market

C. C. HANCH, general manager of the National Association of Finance Companies believes that there is a potential and impending market in this country for 5,000,000 motor vehicles, an annual total approaching the record year of 1929. Mr. Hanch bases this opinion on the fact that there are now 10,000,000 motor vehicles five years or more old, which must soon be replaced.

At the end of 1931 there are going to be fewer motor vehicles in operation than there were at the beginning of the year. This condition never has happened before in this country since our industry began. A replacement market is piling up that will sooner or later begin exerting an influence on motor vehicle buying which cannot be exaggerated. There is a siver lining on the depressing clouds.

Differential Discussions

IN this column Automotive Daily News is glad to present the opinions of its readers on topics related directly to the automotive industry. Automotive Daily News, however, must disclaim responsibility for such opinions. All questions regarding merchandising, technical problems or other information pertaining to automotive industry will be answered without charge in this column.

Diversification Not Elimination The Dealer's Need at Present

Automotive Daily News: When I wrote my previous letter in regard to the Edward Barnett plan for solving the used car problem I did not anticipate that it would be favorably received; it is only human nature that the dealers do not want to admit that it is possible, though not in some cases probable, that they could make money even under existing conditions by the exercise of a little ingenuity.

I did hope, however, that the minority of dealers with above-the-average intelligence might see possibilities in my letter. The letter you published from Mr. McDowell of Connellsville, Pa., shows that this is not the case—my ideas have apparently been either mis-presented or misunderstood.

Mr. McDowell seems to be under the impression that the plan is being used in Hartford and bringing results; if he had studied my letter a little more thoroughly he would have noticed the specific statement that the plan has never been tried.

There are other mis-conceptions in his letter, but since casuistry and technicalities will not help the general situation I will not waste time in argument, but only restate in a general way my thoughts.

In the first place, I grant that dealers cannot usually trade in used cars "right" on new ones (even so, I think that investigation will show that a considerably larger portion of used cars than is generally supposed are traded at a profit—if volume could be confined to these deals the solution would be obvious.) I grant also that factories could do much, and should do much, in the way of securing a higher type of dealer—one with more moral principles and more business sense. These things are fundamental and have been discussed so much that I saw no need to go over them further.

The main idea I tried to present is that there is no general solution for one particular business—no one outright method that will put every automobile dealer back on his feet and making money automatically. I wonder if those who have spoken in favor of Mr. Barnett's plan have thought of the following ideas (I am not speaking against Mr. Barnett—he shows he has studied the problem and has tried to solve it, and deserves credit for his efforts, I just don't agree with him), which I think the most prejudiced will admit are correct:

Who was it who first conceived the idea of buying new car business by used car overallowance? Not the factories. That factories have since at various times encouraged the practice makes no material difference to this point. Are we to be so credulous as to believe that even if Mr. Barnett's plan were adopted the dealers would not find some other way in which to give away a portion of their profit in order to continue to "buy" business?

Several writers on this plan have stated that the manufacturers probably will not adopt it, because it would cut their volume. It is my opinion, backed by that of others in the industry, that whatever plan is adopted in regard to used cars, if consistently adhered to, would have no effect on volume. But I think the manufacturers will consider this possible effect among others: The more restrictions their contracts contain, the harder it is to induce capital to make additional investments in retail outlets.

I hold no brief for the factories, but remember they have their side of the question, too.

Divorcing used cars from new, I think, is a step in the wrong direction. This shows that the fundamental idea of dealers is to specialize in new cars only, which idea I consider basically unsound. A few years ago dealers considered service only an expense, and got out of as much of it as they could—now they are trying desperately to recover this highly valuable item. Consider other specialty lines, such as typewriters, washing machines, etc.—all are notoriously hard to handle (and in regard to discounts—some of these lines have considerably more margin than cars usually carry); then consider department stores, the most stable business known, and the last to really suffer from general conditions. What is the difference? Diversication. The dealer, instead of parting with any portion of his business, should consider ways to make each profitable, and add new lines when practicable.

I know this is hard to do, and in some individual instances impossible. But dealers generally would rather let someone else solve their problems than do any thinking themselves; when they hear of some dealership that manages to make profit they say to themselves, "Bunk," "He has an established clientele," "He has no competition," or some similar remarks to excuse their failure to operate as efficiently as that dealership, when they should analyse his business and copy every one of his practices that can be adapted to their own businesses.

I realize that I have not yet made any one solution of the big problems—and that is not my intention! In the first place, a 500-word letter is not the proper medium for an essay on business administration. In the next place, the majority of dealers do not want to be shown that they are in any way even remotely at fault for existing conditions, and no amount of argument will show them that they have any power to remedy affairs. The minority who do stand on their own feet can get hints enough from this to guide their actions, and, I think, will agree with me on most points.

I do not presume Automotive Daily News desires to devote its entire space to one person, so I will simply state that I will be glad to carry on a private correspondence with any one interested enough to write me, provided they show a desire really to understand my methods, and not merely an inclination to find fault. I don't mean they must agree with me, but that the discussion must be on a mutually considerate basis. Address me at 385 Woodland St.

GEORGE-GORDON BOND,
Accountant, Hartford, Conn.

COMING EVENTS

JUNE

14-19—**White Sulphur Springs, W. Va.** Society of Automotive Engineers, summer meeting.
17-19—**French Lick, Ind.** Steel Founders' Society, mid-summer meeting.
21—**Montlery Track, France.** Automobile Club of France, grand prize race.
22-26—**Chicago, Ill.** American Society for Testing Materials thirty-fourth annual meeting.
22-27—**Boston, Mass.** National Association of Credit Men, convention.
29-30—**Chicago, Ill.** National Association of Taxicab Owners, meeting.

JULY

4—**Altoona, Pa.** Automobile race.
19—**Nurburg-Ring, Rhineland, Germany.** Automobile Club of Germany, grand prize race.

SEPTEMBER

1- 3—**Cleveland, O.** Hotel Statler, Society of Automotive Engineers, twentieth annual aeronautical meeting in conjunction with National Air races.
8-17—**Utrecht, Holland.** Utrecht Fair, bus and truck show.
16-17—**Atlantic City, N. J.** National Petroleum Association, annual meeting, Hotel Traymore.
20-26—**Springfield, Mass.** Eastern States Exposition.
21-25—**Boston, Mass.** American Welding Society, meeting.
28-29—**Atlantic City, N. J.** National Association of Motor Bus Operators, fifth annual meeting, Hotel Ambassador.
26-Oct. 2—**Atlantic City, N. J.** American Electric Railway Association, annual meeting.

OCTOBER

1-11—**Paris, France.** International Automobile Salon.
2- 3—**Houston, Tex.** American Institute of Mining and Metallurgical Engineers, petroleum division meeting.
12-16—**Chicago, Ill.** National Safety Council.
14-16—**Pittsburgh, Pa.** Society of Industrial Engineers, convention.
15-24—**London, England.** International Motor Exhibition, Olympia Hall.
22-28—**Prague, Czecho-Slovakia.** International Automobile Exposition.

Indorses the Barnett Used Car Plan With Additions

Automotive Daily News: It is with considerable interest that I have read daily the comments of various dealers concerning the time-worn and much-mauled subject of used cars. We all wonder how much longer the used car situation and curative measures will continue to be only matters of conversation. It would appear that it was high time that a group of strong-hearted and courageous-minded individuals of authority actually did something of a constructive character with the view to premanently, once and for all times, eliminating the hazards in connection with used cars.

Mr. Barnett of Belleville, Ill., has come the nearest to hitting upon the keynote of the situation. Augmenting the view of Mr. Barnett, I shall set forth the following:

1. The practice of used car tradings will have to be prohibited among new car dealers, otherwise no permanent financial stablity of tangible profits can be anticipated by new car dealers.

2. Prohibitive measures will have to come from and through the manufacturers of automobiles.

3. No arbitrary measures, left to the discretion of the dealers for acceptance, will accomplish any permanent betterment.

Shall we regard the used car situation in the light of its actuality and determine whether or not the three aforesaid principles are, in a measure, correct? There are none who would deny the correctness of the following facts:

1. Used car business is one of the most treacherous businesses of the current period.

2. It requires a remarkable type of business man to make a success of a used car business.

3. New car dealers are not sufficiently endowed with the used car experience, natural business acumen or with the "trader's instinct" to successfully conduct a used car buying and selling business.

4. Used car trading, as a part of new car sales, is a violation of all sound business principles.

5. Under our prevailing conditions, used cars are not bringing prices commensurate with their inherent values.

6. The American people cannot afford to assume a depreciation on their automobiles in excess of $1,000,000,000 annually.

7. Automobile manufacturers must not continue to strive for huge and forced volumes. Contingent hazards in the wake of this forced volume are too devastating, as is proved by prevailing current conditions.

Shall we prescribe the following:

1. Leave used cars alone. That phase of the industry will work out its own salvation.

2. Dealers sell new cars only. Selling new cars is a profitable business, provided the profits are negotiable. Dealers will be able to retain them despite the possibility of lesser volume.

3. Manufacture fewer automobiles, but better ones, at reasonably higher prices, in justification of a somewhat lesser volume.

It is entirely probable that the comments which I have set forth herein will arouse the ire of some. Nevertheless, the foregoing are facts, and stubborn ones. They are advanced with an entirely constructive intent.

C. D. HAYES.
Chicago, Ill.

Delivering Oils and Gasoline Profitably

With summer and its accompanying increase in demand for automobile lubricants and fuels well on its way, the following survey on "Delivering Oils and Gasoline Profitably," which was compiled by the General Motors Truck Company, Pontiac, Mich., should be of particular interest. The full text of the report covering the facts brought out during the survey is appearing serially in Automotive Daily News. The report in pamphlet form is also available at all General Motors Truck Company dealers and distributorships.

THE amount of profitable work a truck accomplishes depends on the quantity and type of work assigned to it through the efforts of the sales department. Profitable work accomplishment—as we have already seen — is a product of high delivery volume and low delivery mileage.

Only sound sales direction and planning on the part of the distributor can increase profitable work accomplishment from this standpoint.

The reason for this is obvious. Getting greater gallon or pound volume, with fewer truck miles, is a matter of cultivating profitable customers within a limited delivery area. Profits on any single delivery depend on three important factors:

1. The distance traveled to deliver the order.
2. The time consumed in delivering the order.
3. The volume, or dollar value, of the order.

A small order to an outlying customer, whose receiving facilities are

WORK ANALYSIS OF A PEDDLER ROUTE

These figures are from observation of a peddler route in the Middle West

Mileage Record

Total mileage covered	22.4
Stops	16
Number of sales	10
Stops resulting in no sales	6
Mileage to "no sale" stops	10.2

Sales Record

Total gasoline sales	225 gal
Total kerosene sales	115 gal
Total lube sales	0
Sales less than $1.00	7
Sales over $1.00—under $1.50	3
Sales over $1.50—under $3.00	1
Sales over $3.00	5

Summary

94% DELIVERED	06% RETURNED
63% MADE SALES	37% NO SALES
54% YIELDED SALES	46% WAS WASTED
91%	9% UNPRODUCTIVE
78	

such that the load must be bucketed, offers a typical situation in which there is no profit on the customer's business. And, conversely, the large volume order, quickly unloaded at a nearby point, offers the greatest opportunity for profit.

Profitable sales management for the petroleum products distributor, therefore, means getting a maximum volume of business out of a minimum of trading area.

This basic rule of sales management cannot be over-emphasized. The executive in charge of sales needs to do more than simply cultivate new customers and bring in new business. His job is to bring in profitable business. And his success is measured solely in terms of profitable sales.

The first step in planning for sales that increase profitable deliveries, therefore, is to define clearly the limits of the profitable trading area. Obviously, those limits depend on many factors, traffic, types of customers served, capacity of delivery trucks, and so on. A review of the limits set up by several successful operators, however, shows that the maximum radius in congested metropolitan areas is from twelve to sixteen miles; and in less congested rural areas, that radius is increased to twenty to twenty-five miles. It must be noted, however, that the areas covered by some operators with peddler routes, where volume is ordinarily small, are far too great to produce profitable deliveries.

An accurate estimate of distances to which deliveries can be made profitably, based on the cost of delivery and the volume of orders, should be a part of every sales executive's working equipment.

(To Be Continued)

DETROIT HUDSON-ESSEX JUNE SALES GAIN 20%

Detroit, June 18.—Sales of Hudson and Essex cars in Wayne county for the first two weeks of June show an increase of 20 per cent. over the corresponding period in 1930, reports Aaron De Roy, president of the Aaron De Roy Motor Car Company, Hudson-Essex distributor.

SOUTH SEEKS UNIFORM BUS-TRUCK CERTIFICATE

Atlanta, Ga., June 18 (UTPS).—Commissioners from nine states have been invited to meet in Atlanta and work out a uniform certificate of operations for bus and truck operators, according to the Georgia Public Service Commission.

Public service commissioners from Virginia, North and South Carolina, Florida, Alabama, Mississippi, Louisiana, Tennessee and Kentucky have been asked, and replies indicate a good attendance. The date for the conference has not yet been set.

NEW COMPANY ORGANIZED TO OPERATE ILL. BUS LINES

Springfield, Ill., June 18.—The Egyptian Motor Lines, Inc., has been organized to take over the Egyptian Transportation System, which was recently sold at receiver's sale, and is authorized to purchase equipment to cost $160,000 and to rent ten buses owned by the Illinois Terminal Transportation Company. The company operates lines between Pana and Springfield and Pana and Vandalia.

BUS SYSTEM TO REPLACE TROLLEY LINE IN SCRANTON

Scranton, Pa., June 18.—The Scranton Railway Company has received permission from the Public Service Commission to abandon and scrap its interurban trolley line between Scranton and Carbondale. A subsidiary, the Scranton Bus Company, will shortly establish and operate a modern bus system between the two cities, a one-way distance of eighteen miles.

DAILY S.A.E. PROVES ONE OF MEETING'S BRIGHTEST SPOTS

(Continued from Page 1)

present is that a vote of thanks is due to the Budd organization, through whose courtesy the SAE appeared and to the co-operating Young & Rubicam agency and the earnest editors, reporters and the gang generally for giving the summer meeting one of its pleasantest daily features.

CLASSIFIED ADVERTISEMENTS IN THE AUTOMOTIVE DAILY NEWS BRING RESULTS

Announcing

THE NEW

SUNOCO MOTOR OIL

Now Mercury Made . . . a process which not only revolutionizes petroleum refining, but which is also a distinct contribution to science

Rear Engine Cars, Synthetic Oils Feature S.A.E. Session

(Continued from Page 2)

papers that we are to have presented this morning deal with vital problems of primary importance to any automotive engineers. The two gentlemen who are to contribute to the morning's discussion are, you might say, old timers in the S. A. E., and have, over a period of a considerable number of years, been right on the job when a job along that line was to be done, and they have always presented their papers in very good shape.

"In this era of increasing speed and more general use of automobile and automotive equipment nothing can be more important from the operator's standpoint than that of lubrication. Lubricating oil engineers have been working smoothly and in close harmony with the automotive engineers for years, and we, as a society, owe them a debt of gratitude for their co-operation."

D. P. Barnard, Standard Oil Company of Indiana: "The purpose in presenting this paper is primarily to give a little different picture as to the effect of viscosity on performance and on some of the characteristics of lubricating oil which make up for difference in viscosity, temperature and behavior." Mr. Barnard presents paper.

A. E. Becker, Standard Oil Development Company: "In analyzing any problem it is always well to consider extreme cases. The ideal solution for the lubrication of any machine is that the lubricant used has the same viscosity under all operating conditions. There are two methods by which this ideal situation may be approached, namely: First, all working parts of the machine may be kept at the same temperature. It is then merely a question of selecting an oil of suitable viscosity and stability at the operating temperature, a condition quite well approached in the case of a watch.

Ludlow Clayden, Sun Oil Company—The history of the petroleum industry over the last ten years has shown that almost anything can be done with petroleum if the incentive is strong enough. So while this material described does represent a very great accomplishment, even at that I am sure the authors of the paper would agree that it is probably just a start as to what can be done if we can go ahead and work on this kind of thing with the idea that we are producing something to fill a special need and to be worth a special price, and that we are not in any way suggesting that all our oils in the future are going to be controllable in any way we desire.

"Second, in machines such as the automobile, where the various operating parts are not only at widely different temperatures, but the machine as a whole is expected to function equally well in winter or summer, the ideal solution would be a lubricant the viscosity of which remained constant with change in temperature."

Neil MacCoull (Texaco): "It seems to me sometimes it is rather absurd to talk about viscosities on the Saybolt scale vastly above where the Saybolt instrument can ever take such a reading. Of course, it is a little difficult for people to adapt their minds to a new scale, or at least one that they are not familiar with, such as the absolute scale, but still it is not very difficult. Charts are available now expressing a scale equivalent for absolute units. I hope we will see more of these very high viscosities taken at low temperatures expressed in absolute units instead of something in the neighborhood of 100,000,000 Saybolts.

"I am particularly interested in the oils for aviation engines. The low pour point oils, permitting reasonably easy starting, seem to be more important now than they were a few years ago. I remember that when they used to start an aviation engine in cold weather it was customary to cook the crank case or to drain the oil at stopping and to warm it up before starting.

"As far as the details of shock absorber use and steering gear use are concerned, they may be important to some sections of the society, but it seems to me that the engine improvement or improvement in engine oils is our most important consideration.

CENTENNIAL CELEBRATED BY HARVESTER COMPANY

New York, June 18.—The International Harvester Company, which manufactures trucks, coaches and tractors, as well as farm machinery, is this year celebrating the centennial of the invention of the world's first reaper by Cyrus Hall McCormick.

The New York celebration took the form of a dinner at the Hotel Pennsylvania, with one of the famous inventor's grandsons, Cyrus McCormick, Jr., delivering the principal address of the evening.

A replica of the first reaper was exhibited. A film entitled, "Romance of the Reaper," dramatized the events surrounding the invention of the reaper and subsequent developments in the history of the Harvester organization during the past century.

ADVOCATES COURTESY TO CUT TRUCK COSTS

Swampscott, Mass., June 18.—Material reductions in truck operating costs can be effected through training of drivers in courtesy and safety, H. R. Cobleigh of the motor truck department of the National Automobile Chamber of Commerce declared today at the annual convention of the New England Coal Dealers' Association.

Lower overhead and insurance premiums and greater customer and public good-will were mentioned by Mr. Cobleigh as the "dividends" which a fleet operator might expect to derive from the safer and more courteous operation of his vehicles.

He also advocated that truck owners provide some incentive in the form of a bonus plan to win the co-operation of their employees. Mr. Cobleigh spoke on the same subject at a meeting of the Springfield Motor Transport Council in Springfield tonight.

NEW AUTOCAR FACTORY BRANCH AT NEWARK, N. J.

Newark, N. J., June 18.—Excavations started this week at the corner of Jefferson and Malvern Streets for foundations of a new factory branch building for the Autocar Company, motor truck manufacturers of Ardmore, Pa.

The site of the new building runs 100 feet on Jefferson Street and 300 feet on Malvern Street. The new autocar branch will inclose 27,000 square feet of floor space, practicallly all of which will be made available for the servicing of Autocar trucks in Newark and vicinity.

The new building will be built of brick with cut . ne trimming, and will be thoroughly modern in construction and in equipment. The new Autocar location is more accessible than the old one, especially in view of the local traffic changes already accomplished and contemplated. The contract provides for the building to be ready for occupancy on September 1.

CROWN CORK & SEAL, DETROIT GASKET MERGE

Detroit, June 18.—The consolidation of the Crown Cork and Seal Company, Inc., of Baltimore and the Detroit Gasket and Manufacturing Company is now assured, as more than 98 per cent. of the stock of the Detroit Gasket and Manufacturing Company has been deposited with the Fidelity Bank and Trust Company of Detroit.

The unification of the Detroit Gasket and Manufacturing Company, Inc., and the Crown Cork and Seal Company will result in further diversification of products and to bring about a savings in manufacturing and to facilitate distribution.

White Sulphur Favored for Further Summer Meetings

(Continued from Page 1)

man of the women's golf committee, won the first low gross with a score of 155; Mrs. J. B. Funk was second with 160. The first low net was won by Mrs. D. G. Knight, with 134, and Mrs. J. G. Monjar was second with 136.

D. P. Barnard, Standard Oil of Indiana, copped the first place in the field day yesterday with a total of 19 points. C. B. Bishop, Bureau of Standars, was second with 18. Mrs. D. M. Borden tied with Miss Alice Brown for first place in the women's division with scores of 23 each. Mrs. Borden won the first prize on a toss and Miss Brown took second. Mrs. Murray Fahnstock won third with 13 points. E. C. Rogers, Bureau of Standards, won the crab race, with C. S. Bruce, Bureau of Standards, second. Ed Lowe of the Handy Governor, lost on a dragging brake.

W. E. England, Houde Engineering, won the block race, with C. S. Bruce second, Sam Dickie, director of the Cleveland Playground Commission, handled this event. Mr. and Mrs. A. G. Haskell, Champion Spark Plug; Mrs. D. M. Borden and Mr. and Mrs. M. Fahnstock comprised the winning team in the "whoops-my-dear" event.

Mrs. C. S. Bruce, D. P. Barnard, Mrs. D. P. Barnard, Alex Brown, Bob Drummond of the National Broach and Machine Company, and C. S. Bruce won the match box-passing event.

The all-up race was won by a team composed of H. E. Figgie, Standard Steel Spring; A. J. Poole, United American Bosch; D. E. Grasett, Crane Packing; F. K. Glynn, American Tel. and Tel.; C. F. Ostermeyer, Willard Storage Battery, and M. J. Brennan. This team also captured the sack race. Miss Alice Brown won the balloon blowing race, with Mrs. G. T. Greenlee, Imperial Brass, second. Mrs. Borden captured the clothes pin race, with Miss Brown second.

C. B. Bishop outpointed G. C. Rogers in the boxing event. Mrs. C. S. Bruce, Miss Alice Brown, Mrs. D. M. Borden, Miss Helen Schatz, Miss Grace Jeneway, Mrs. Murray Fahnstock, C. S. Bruce and Dan Barnard took honors in the sedan race. Mrs. A. G. Haskell copped the "Kid Boots Derby."

One of the funniest events was the roly-poly race, won by C. B. Bishop, which consisted of rolling a roll of paper across the field, until it was completely unrolled.

Another hilarious event was the egg-throwing contest. J. T. Greenlee, Imperial Brass, and A. C. Nuth, J. H. Williams Company, ended with their eggs uncracked.

HOFFMAN ADVOCATES ATTENTION OF POLICE TO ENDING CONGESTION

New York, June 18.—"'Keep the traffic moving' ought to be the objective of every police and traffic official," says Paul Hoffman, member of the street traffic committee, National Automobile Chamber of Commerce, and vice-president Studebaker Corporation.

"High speed isn't essential, but movement is. Most drivers do not resent slow movement in heavy traffic, but do object violently to alternately starting and stopping—mostly stopping.

"Suppose for example, that instead of sending police out to look for speeders special flying squadrons were designated whose sole job would be to 'keep the traffic moving.' Of course, they wouldn't overlook the speeders, but their most important task would be to catch the thief of traffic time—congestion.

"Such officers patroling the main thoroughfares during rush hour periods could keep slow moving vehicles to the curb or send them to parallel streets; prevent blocking of traffic lanes by double parking and tail end truck deliveries during rush hours, secure more efficient utilization of street space by seeing to it that traffic stays in lanes instead of straddling the middle of the street.

"Vehicles consistently parked illegally where they hinder the inbound or outbound flow of traffic would soon be cleared under a consistent campaign of ticketing and a full extra lane made available in the direction of maximum traffic flow."

FORD WORKERS TO GET $880,000 FUND RETURN

Detroit, June 18.—Ford Motor Company employees will receive about $880,000 on July 1 as the semi-annual return on their investments in the Ford investment fund.

The employees have about $19,000,000 invested in the fund. The return is at the guaranteed rate of 3 per cent. semi-annually, plus a special return of 2 per cent. More than one-fifth of the company's employees have invested in the fund.

CLASSIFIED ADVERTISEMENTS IN THE AUTOMOTIVE DAILY NEWS BRING RESULTS

Cumulative New Commercial Car Registration Statistics, May, 1931

Returns for today: Alabama, Missouri, Nebraska, New Hampshire, North Carolina, Oregon, Virginia and Washington.

In this table 22 states and the District of Columbia. Comparative figures for May, 1930, will be found on Page 7.

States	Autocar	Brockway-Indiana	Chevrolet	Diamond-T	Dodge	Essex	FWD	Fargo	Federal	Ford	G. M. C.	International	La France-Republic	Mack	Paige	Relay	Reo	Rugby	Sterling	Stewart	Studebaker	Whippet	White	Willys	Willys-Knight	Miscellaneous	Totals	States
Alabama			143		2					163	2	8		1	2	1					1		3			3	329	Alabama
Arkansas			63		2			1		100	2	13					1						5	1		2	190	Arkansas
Delaware	4		41		2		1		1	41	1	12										1				3	107	Delaware
Florida			122		7				4	188	2	27				1	6					2	2	1		2	364	Florida
Idaho			55		16					89	3	9									4			3			179	Idaho
Illinois	3	5	429	36	71			1	3	641	18	137		13		3	6		5	1	26			14	1	39	1452	Illinois
Minn.			328	15	30				7	413	10	128	1	4	1		14	2			20		6	25		9	1013	Minn.
Missouri		7	329	10	25				9	366	10	42	1		1		2	1	1		9	5	5	11	1	12	847	Missouri
Montana			32		3					76	6	30		1			5		1		1			2		2	159	Montana
Nebraska			148	3	12			1		228	4	54		2							7		1	9		9	478	Nebraska
N. Hamp.	1	1	72	1	11					161	7	10		1			5			1	6		2	8			287	N. Hamp.
Nor. Car.	1		245		24					267	5	36		2		1	4				1			2		10	598	North Car.
Nor. Dak.		1	73		16					82	5	76					1				5		1	3			263	Nor. Dak.
Oregon			110		9				4	210	11	24		2			3		6		6		2			12	399	Oregon
Rho. Isl.	2		46	6	26			1	3	119	4	10		7			4		2	1					1	2	234	Rh. Island
So. Caro.			125		3					151	1	9	1	1			1				3					2	297	S. Carolina
S. Dakota			64	7	11					81		46			1		2	1			6						219	S. Dakota
Utah			55		4	1				74	4	9			1		4				1			1			154	Utah
Virginia	5	3	325	2	27				6	338	14	44	2	4		2	3			1	3		6	5		5	795	Virginia
Wash'ton			96		12	1			1	209	7	22		1			2	2	1		12		7	3		23	399	Wash'ton
W. Va.	1	3	150	1	25					155	3	25		2		1	5			1	5		5	8		1	391	W. Va.
Wiscon.			319	17	19		4		2	402	17	59		1	2		4	1	3	1	18		2	19		10	900	Wisconsin
D. of Col.	3		46	6	3	2			1	124	6	9		7		1	1						2			4	215	Dist. of C.
Totals	20	20	3416	104	360	4	5	4	41	4678	142	839	5	49	8	10	73	7	19	6	134	8	49	115	3	150	10269	Totals

AUBURN-CORD SENDS SERVICE MANAGERS TO FACTORY SCHOOL

AUBURN, Ind., June 18.—More than 100 Auburn and Cord service managers and shop repair foremen attended a two-day factory service school at the administration building of the Auburn plant held under the supervision of A. H. McInnis, Auburn supervisor of service.

The school included instructions on use of labor-saving tools and approved methods of servicing the new Auburn and Cord models. Representatives from the different parts manufacturers that supply products for Auburn and Cord were present and took part in the school discussions.

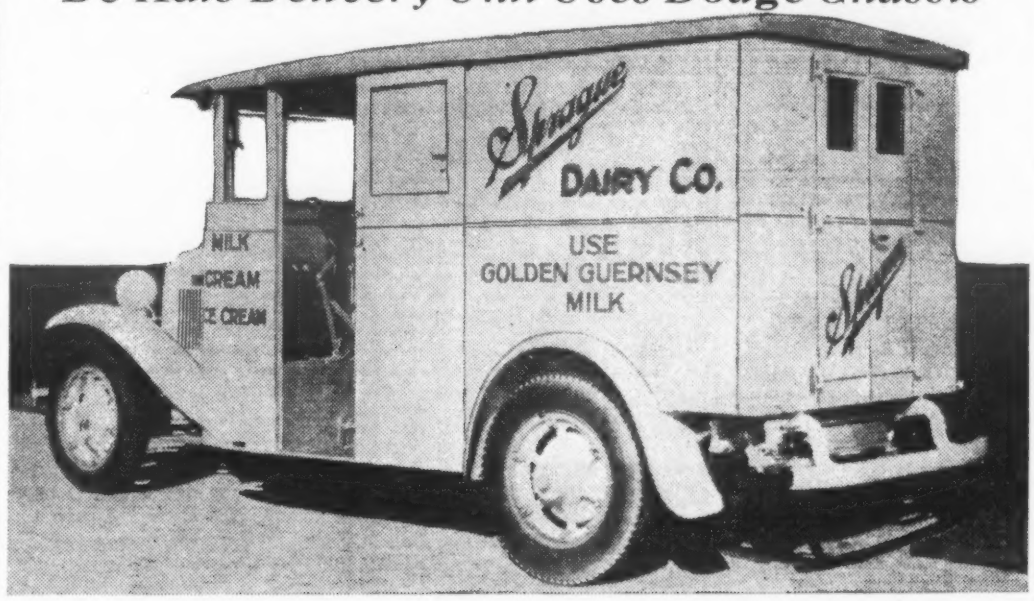
Among these were: H. E. Josselyn, King-Seely Corporation; E. L. Dixon, Columbia Axle Company; S. R. Hawkins, Wheelber Schebler Carburetor Company; Ralph Teetor, chief engineer of Perfect Circle Company; R. O. Yost and H. B. Nichols, Delco Products Corporation; H. H. Dalpey, Long Manufacturing Company; F. M. Sieg, Vacuum Oil Company; E. J. Avery, Detroit Gear Company; C. H. Barton, L. G. S. Devices Corporation; R. R. Wilson, Delco Remy Corporation; Fred Livingston, J. H. Lindouer and W. Blieler, Lycoming Manufacturing Company; P. E. Miquelon, Universal Products Company; J. B. Funk, Champion Spark Plug Company; R. L. Bagshaw and Frank Grant, Midland Steel Products Company.

W. B. Prosser and Stanley Murray of the Perfect Circle Company showed a motion and talking picture.

In addition to the speakers from the other companies, A. H. McInnis, H. C. Snow, George Kublin and other plant officials addressed the gathering. Between talks the meetings were opened to discussion. R. H. Faulkner, president of Auburn, and N. E. McDarby, vice-president in charge of sales, addressed the gathering at a banquet.

The school was climaxed by one of the largest driveaways of the new cars ever made from the Auburn plant, over forty of the men in attendance taking new cars back with them.

De Kalb Delivery Unit Uses Dodge Chassis



THIS DE KALB STEP-GO BODY is mounted on a Dodge four-cylinder chassis equipped with single piston control. Applying of brakes and releasing the clutch is an automatic operation. The unit has four speeds forward and one reverse. It is priced at $1,170 within a 300 mile radius of De Kalb, Inc.

A. J. SCAIFE, WHITE MOTORS, NOMINATED NEW S. A. E. LEADER

(Continued from Page 1)

Standard Oil Company of Indiana; S. O. White, chief engineer Warner Gear Company, Muncie, Ind.

The three who will hold over for another year are F. S. Duesenberg, president of Duesenberg, Indianapolis, Ind.; Norman G. Shidle, Automotive Industries, directing editor of the Chilton Glass Journal Company, Philadelphia, Pa.; C. E. Tilston, chief engineer Willys Overland, Ltd., Toronto, Canada.

Other members are C. W. Spicer, treasurer; Edward P. Warner, editor of Aviation, past president; Vincent Bendix, president, whose term of office expires this year, and John A. C. Warner, secretary and general manager.

OPENS WILLYS SALESROOM

Council Bluffs, Ia., June 18.—The Gregory Motor Company, 143 West Broadway, has formally opened its salesroom for Willys and Willys-Knight cars, and Willys trucks.

50 TRAVEL COUNSELORS OF A. A. A. TOUR N. J.

Newark, N. J., June 18.—Following a breakfast at the Hotel Bristol, New York, Tuesday morning, which was attended by officials of the New York Automobile Club, fifty travel counselors from A. A. A. Clubs in fourteen states on the Atlantic seaboard started their goodwill tour of summer resorts and points of historic interest in New York, New Jersey, and Pennsylvania.

The tour will wind up here Wednesday afternoon, June 24, after the group has had ample time to cover the vacation resources of this vicinity, particularly in New Jersey.

Among the delegates from the Empire State organization are: Mrs. H. E. Nellis of the Albany Automobile Club, Miss S. Wechsler of the New York Automobile Club, Miss Mildred Cristall, of the Automobile Club of Buffalo, Matie S. Drake of the Chautauqua County Automobile Club, Anna L. Driscoll of the Automobile Club of Oswego County, H. J. Angley of the Jefferson County Motor Association, W. Frank Thompson of the Automobile Club of Rochester, Joseph L. Swenson of the Troy Automobile Club and B. Suskind of the Auto Club of Ulster County.

FIRM REORGANIZED

Buffalo, June 18.—Reorganization of the Oldsmobile Buffalo Corporation, 1239 Main St., has been completed, David Howell now being sole owner. He has appointed Ward Williams as sales manager.

CLECO DISTRIBUTORSHIP FOR PITTSBURGH NAMED

Cleveland, Ohio, June 18.—F. H. Burr, director of the automotive division of the Cleveland Pneumatic Tool Company, has announced the appointment of the Pittsburg Auto Spring Company as distributor for the company's automotive products in Pittsburgh.

J. W. Broughton, who has been distributor of these products in Pittsburgh for six years, has been named vice-president of the Pittsburgh Auto Spring Company and will be director of sales and service for its complete line, including the Gruss air springs and multi-power brakes.

ROAD BUILDERS HOLD TRANSPORT SURVEYS ECONOMY GUARANTEE

(Continued from Page 1)

possible. Centralized planning and budgeting based on modern conditions rather than on conditions existing a century ago are necessary for economy. Connected highways comprising a system not limited by political boundaries is the ultimate object.

Gasoline taxes and motor vehicle registration fees should be used only for highways and the state should be the only levying agency.

The primary system (state highways) should be financed by current funds or bonds, depending on the degree of completion of the system, and the traffic requirements as determined by transportation surveys. Where highway improvement is in the early stages, surfacing of main roads benefits a large number of people immediately and bonding is desirable. The secondary system (county trunk highways) should be financed by state aid and local taxes or bonds and third-class highways (purely local roads) by local taxes, county bonds or special assessments.

In metropolitan areas, which are carrying a large part of the total traffic, relief measures on trunk highways should be considered by the state through regional planning bodies.

$50,000 GARAGE CONTRACT AWARDED AT DES MOINES

Des Moines, Ia., June 18.—Contract for construction of a two-story garage at northeast corner of 11th and Locust Streets, to be occupied by the Duffield-Hinton, Inc., automobile distributors here, has been let. The new building will be 132 feet square and will be finished in brick. Estimated cost is $50,000. D. S. Chamberlain and W. F. Mitchell are owners of the property.

TODAY

More than ever, outstanding performance and unmatched value are selling BROCKWAY-INDIANA TRUCKS

See these modern-day trucks and judge them by what they do—all truck construction, not a single unit adapted from passenger-car practice.

See them and compare their value.

BROCKWAY-INDIANA TRUCKS

BROCKWAY MOTOR TRUCK CORP.,
General Office and Factory
Cortland - - - - New York

Experience is continually pointing out the low operating expense of Wisconsin Axles.

WISCONSIN AXLES

WISCONSIN AXLE CO.
OSHKOSH WISCONSIN

Cumulative New Commercial Car Registration Statistics, May, 1930

This table is repeated for comparative purposes only. May, 1931, figures will be found on Page 6.

States	Autocar	Brockway-Indiana	Chevrolet	Diamond-T	Dodge	Essex	FWD	Fargo	Federal	Ford	G. M. C.	International	La France-Republic	Mack	Paige	Relay	Reo	Rugby	Sterling	Stewart	Studebaker	Whippet	White	Willys	Willys-Knight	Miscellaneous	Totals	States
Ala., 1930			197		6	1			1	171	7	19		4			5				2		2	1			416	Ala., 1930
Ark., 1930			152		7			1		142	8	60		3			1						2	2		2	380	Ark., 1930
Dela., '30	6	4	43	1	4	1				88	14	9		1			3	1		3				1			179	Dela., '30
Fla., 1930		4	148		9				1	223	6	8		1		1	1									1	403	Fla., 1930
Idaho, '30			72		7		2			117	1	8							1		1			1			210	Idaho, '30
Ill., 1930	4	11	661	71	61			12	4	911	36	135		18	3	2	19	1	2	5		13	12	15		78	2074	Ill., 1930
Minn., '30		6	419	16	49	3	1	9	2	611	34	114	1	12	2	2	16	2			4	5	16	14	1	18	1357	Minn., '30
Mo., 1930		15	461	16	44	2			5	516	43	81		6	5	1	8	1		2	1	6	9	10		28	1260	Mo., 1930
Mont., '30			63	1	9			5	1	97	6	32		8			4				2	2	5	2		1	238	Mont., '30
Neb., 1930		1	198	2	6		4	1		259	19	50		3	3		2	1			1	1	11	6	1	5	574	Neb., 1930
N. H., '30	1	7	94	18	7	1			5	173	8	19		4			11			6	3	2					359	N. H., 1930
N. C., '30			265		14	1		2	1	292	7	24	1	2			1	1			2		4	3	1	10	631	N. C., '30
N. D., '30			86	6	7			5		113	7	68					11	1				1		2	1	3	311	N. D., 1930
Ore., '30	2		121		6	1		5	6	168	14	18	1	9	2		2		2		1	1	6	3	1	4	373	Ore., 1930
R. I., '30	3	4	56	2	29			6	4	102	11	12		1			14	1	2		1					4	252	R. I., 1930
S. C., '30		1	134		1		1			188	4	5		1			1				2	1	1			1	340	S. C., 1930
S. D., '30			99	3	5			1	1	84	1	44		1			11				1	2	1	3	1	1	259	S. D., '30
Utah, '30			73		8					132		5		2			7	3			1		2	1		5	239	Utah, '30
Va., 1930	7	12	454	2	36					422	29	39	7	17		2	12	3		3	1	1	14	3		5	1069	Va., 1930
Wash., '30	1		143		9	1		1	2	335	14	25		4	1	1	9	1	3		1	2	13	1		40	607	Wash., '30
W.Va., '30		4	155	2	38	1		1	3	189	18	57	1	1	1		9	1		2	1			1		5	490	W. Va., '30
Wis., '30			449	37	27	1		4	7	563	29	96		3	1	3	24	1	14	7		6	3	10		23	1312	Wis., '30
D. C., '30	1	4	31	4	3	2			1	94	3	8		1	1		4					2	5				164	D. C., '30
Totals	25	73	4574	181	392	15	8	53	44	5990	319	936	11	102	19	12	175	18	24	28	29	45	106	79	6	233	13497	Totals

Kent Describes Methods of Testing Low-Temperature Star Performance

Discusses Fuel Supply; Cranking Performance; Test Of Cranking Speed; Cranking Capacity Test; Engine Cranking H. P.; Starting Motor Gear Ratio; Ignition

By P. J. KENT, M. S. A. E.

Chief Electrical Engineer Chrysler Corporation, Detroit, Mich.

The following, in part, is a paper to be presented today at the summer meeting of the Society of Automotive Engineers, at White Sulphur Springs, W. Va.

This paper deals with the testing and design of equipment which is of vital importance to assure successful starting of automobile engines at low temperatures; except that it will not attempt to cover that phase of the problem which has to do with the selection of proper lubricating oil. Successful low-temperature starting depends upon the fulfillment of the following requirements:

1. Positive supply of oil to the carburetor.

2. Means for cranking the engine over a reasonable period of time and at a reasonable speed; the more positive the control of cranking, the easier will be the problem of starting.

3. Mixing the fuel and air in correct proportoins for firing and delivering this mixture to the cylinder.

4. Igniting the mixture.

These should be accomplished so far as possible without the exercise of skill or special knowledge on the part of the operator.

For cold-starting development, certain standard conditions for making tests had to be adopted so that results and data collected over a period of time could be compared. They are given here, not with the implication that they are universal, but rather that they represent only the standards used in our laboratory.

1. Air, oil and cooling solution in the engine; storage battery; starting motor and the engine under test to be thoroughly chilled to 0 degrees Fahrenheit before each test is made.

2. A grade of winter oil having uniform physical properties was used for all cranking performance tests. In virtually all cases, tests were made with fresh, undiluted oil and then duplicated with similar oil diluted with 15 per cent. of kerosene. The latter probably represents the condition of oil in the average engine in winter time.

3. A grade of gasoline having uniform distillation properties.

4. Battery performance, as designated by Willard curves for new batteries at 0 degrees Fahrenheit.

5. A uniform method of preparing the engine prior to making tests for cranking performance. This method will be described later.

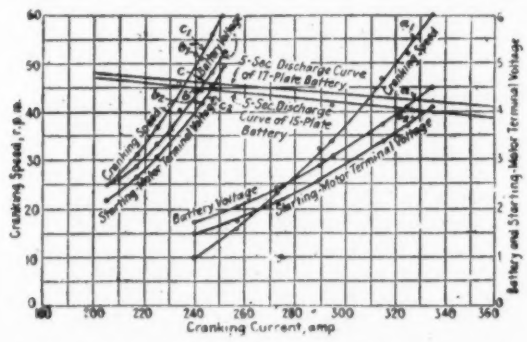


FIG. 1. Cranking speed tests on an eight-cylinder engine with three combinations of starting motor and battery

The tests were made at a temperature of 0 degree Fahrenheit, and with oil that had been diluted with 15 per cent. of kerosene. Below are given particulars of the various combinations tested, the cranking current, the voltage at the starting motor and battery terminals for various cranking speeds, together with pedetermination of actual 0-degree cranking speed for the starting motors used in the test and any desired battery for which the 0-degree 5-second discharge characteristics are known.

Combination Gear-Reduction Type	a Direct	b Back Geared	c Back Geared
Ratio	9:115	11:115 and 14:29	11:115 and 14:29
Plates in battery	17	15	17
Cranking current, amperes	328.0	242.5	244.0
Starting-motor voltage	3.85	4.15	4.25
Cranking speed, revolutions per minute	55.0	51.5	53.0

The intersection of the 5-second battery-discharge curves with the battery-voltage curves at a, b and c gives the battery voltage for the corresponding combinations tested. Projecting these points to intersect the cranking-speed curves at a1, b1, c1, and the starting-motor terminal-voltage curves at a2, b2 and c2, gives the speed at which the engine would be cranked and the starting-motor terminal voltage for the corresponding battery, starting-motor and gear-reduction combination; and on the base-line the cranking current is indicated.

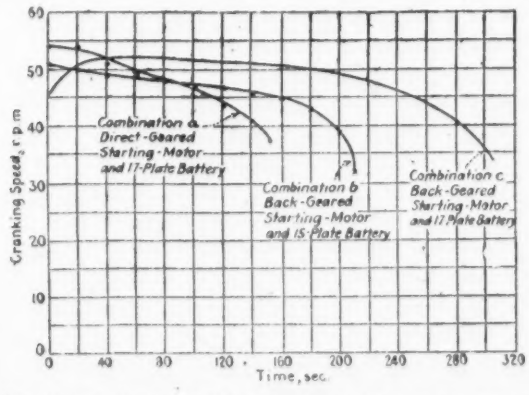

Cranking Speed, r p m
Time, sec.
Combination a Direct-Geared Starting-Motor and 17-Plate Battery
Combination b Back-Geared Starting-Motor and 15-Plate Battery
Combination c Back-Geared Starting-Motor and 17-Plate Battery

FIG. 2. Results of three cranking capacity tests made on an eight-cylinder engine

The temperature and oil conditions and the starting motor and battery combinations were the same as for the cranking-speed test of Fig. 1. The results are given below:

Combination	a	b	c
Current at start, amp.	365.00	245.00	270.00
Current at finish, amp.	310.00	215.00	205.00
Starting-motor voltage, start	3.85	4.25	4.20
Starting-motor voltage, finish	3.00	3.00	3.00

Fuel Supply to the Carburetor

In choosing a fuel pump, the pumping capacity at cranking speeds in relation to the engine requirements should not be overlooked. Measuring the fuel-pump capacity per stroke, while keeping the lift and delivery conditions the same as on the car, is very simple. If the full capacity of the pump is required, the carburetor float-bowl needle valve must, of necessity, be wide open, and the pump capacity should be measured accordingly.

The next step is to measure the fuel demand of the engine under the condition of operation for winter starting.

Developing the Cranking Performance

The operating characteristics of gasoline engine, fuel, lubricants and electrical equipment are such that, if the cranking performance of the engine is developed to take care of good starting at cold temperatures, it will automotically be satisfactory for summer starting. The whole problem, then, is to arrive at some test condition which is sufficiently severe to represent the starting problem of, say, 98 per cent. of the car owners during the winter months. Without attempting to fix a definite standard, we always strive to develop our cranking to give a minimum speed of forty revolutions per minute after the engine, oil and battery have stood for twenty-four hours at a temperature of 0 degrees Farenheit, the oil in this case to be our standard winter-test oil, with 15 per cent. of kerosene dilution, and the battery to be fully charged.

Cranking Speed Test

This test consists of cranking the engine with the starting motor, using a 6-volt battery in series with a variable-voltage generator, the voltage of which can be varied from practically zero up to 8 or 9 volts. For each voltage we observe the starting motor current, the voltage across its terminals, the oil temperature and the cranking speed. Curves are then plotted, using current as a base line and starting motor voltage and speed as ordinates.

Fig. 1 shows the results of cranking-speed tests on an eight-cylinder engine with two different starting motors and illustrates the predetermination of engine cranking speed with three combinations of starting motor and battery. The electrical characteristics of a series field starting motor are such that the starter torque is a direct function of the starting-motor current and the speed is a direct function of the starting motor terminal voltage, minus the IR drop in the motor.

Above the observed starting-motor-voltage curve is plotted the required battery-voltage curve for the corresponding cranking speeds.

After the tests with diluted oil are completed the engine is removed from the cold room, run for a short time to warm the oil, and the diluted oil is then drained and replaced with fresh, undiluted oil. The engine is prepared in the same way and then all tests are repeated. The fresh-oil tests represent a much more severe condition, and, in general, the cranking speed with fresh oil will be roughly about one-half of what it is with diluted oil.

The data collected from the foregoing tests are sufficient to enable us to decide upon the correct equipment so far as initial cranking speed is concerned.

Cranking Capacity Test

The cranking capacity test is made by preparing the engine for the cold room the same as for the cranking speed test. However, the battery under consideration is connected directly to the starting motor through a circuit equivalent to that on the car. The batteries for this test are previously tested for 5 seconds voltage and 300 ampere capacity at 0 degree Fahrenheit, to make sure that they are up to specifications. The engine is then cranked continuously until the voltage across the starting motor terminals is reduced to three volts.

The current draw and the starting-motor terminal voltage, which is practically the same as ignition voltage, are observed at the start and at the end of the test. A Veeder counter checks the total crankshaft revolutions, and, in addition, the cranking speed is checked at the start and at 20-second intervals until the test is completed.

Curves in Fig. 2 show the results of three cranking capacity tests made on an eight-cylinder engine, using the same three combinations of starter and battery equipment as for the cranking speed test curves shown in Fig. 1. While the initial cranking speeds are about the same in all cases, the length of time for which the engine can be cranked

(Continued on Page 10)

Must Solve Oil Usage Problem Before Those of Cold Starting, Lubrication

Factors Which Affect Oil Consumption and Methods Of Overcoming Them Presented; Mechanical Changes May Be Involved as Well as Certain Changes in Lubricants

By H. C. MOUGEY

General Motors Corporation Research Laboratories, Detroit, Mich.

The following, in part, is a paper presented before the annual summer meeting of the Society of Automotive Engineers at White Sulphur Springs, W. Va.:

Fear of scored engines and burned-out bearings, due to lack of oil, is the principal reason why the subject of oil consumption is of interest to the motoring public. Conservation of natural resources is another reason sometimes given for objecting to high oil consumption. But the total amount of lubricating oil for all purposes is only 3.7 per cent. of the crude oil production, and the lubricating oil used in automobiles is less than 1½ per cent.

The problems of cold-starting and operating the engines in cold weather are other reasons for considering oil consumption, but the motoring public does not seem to recognize them as oil-consumption problems. Many workers have shown that for the average automobile the viscosity of the undiluted oil should be less than 50,000 sec. at 0 deg. Fahr. to permit cranking the engine. This oil, which is required for winter operation, will have a low viscosity under high-speed operating conditions in either winter or summer. This low viscosity oil will result in low miles per gallon or bad oil consumption under high-speed driving conditions. As a result, the motoring public will try to use oils of higher viscosity to obtain more miles per gallon of oil and thus will increase the starting and winter lubrication problems. The oil-consumption problem must be solved before cold-starting and winter lubrication problems can be solved. This is the real reason why the automobile and oil industries as well as the public should be interested in oil consumption.

The factors affecting oil consumption, in the order of their importance, are:

1. Engine speed; 2, oil leaks; 3, design of the lubricating system and changes due to wear; 4, viscosity of the oil; 5, volatility of the oil; 6, pour test; 7, possibility of effects from carbonization of the oil-control rings; 8, length of time between oil changes.

Factors 4, 5, 6 and 7 are the only ones of the foregoing for which the oil companies are responsible. The automobile companies and the driving public are responsible for factors 1, 2, 3 and 8.

Engine Speed—Oil consumption is affected by engine speed on account of:

(a) Decrease in viscosity of the oil with increase in temperature incident to high speed.

(b) Failure of the piston rings to scrape off the oil at high speed.

(c) Increased amount of oil thrown on the cylinder walls at high speed on account of:

1. Increased oil pressure from the oil pump due to higher pump speed.

2. Additional effect of the crankshaft as a centrifugal oil pump in the case of engines with pressure lubricating systems.

3. Greater tendency of oil to leak past the connecting-rod bearings on account of the lower viscosity of the oil incident to high temperature resulting from high speed.

These factors are all well known, even if their effects are not always appreciated.

Oil Leaks—Oil leakage includes:

(a) Liquid leakage at stationary joints of the crank pan with the crank case, lubrication fittings outside the crank case, etc.

(b) Mist and vapor losses at breathers, crank case ventilators, oil-filling openings and other openings into the crank case.

(c) Liquid losses at joints where rotating members penetrate the crank case, as the front and rear crank shaft bearings, certain camshaft bearings, etc.

Leaks are affected greatly by speed because:

(a) Vapor and fog are greater at high speed and high temperature.

(b) The viscosity of the oil is much lower, due to the high temperature resulting from high-speed operation of the car.

(c) Liquid losses at all openings are greatly increased by increased pressure inside the crank case.

Most of this pressure difference at high speed is caused by the vacuum outside the crank case resulting from the movement of the engine through the air.

Blow-by does not appreciably increase the pressure in the crank case and is not an important factor in pressure differential between the inside and outside of the crank case. Crank-case ventilators and other openings into the crank case usually are so large that they do not permit pressures to build up on account of blow-by, but any changes involving closing up these openings might permit blow-by to become important in this respect.

Design of the Lubricating System, and Changes Due to Wear—The design of the lubricating system is a very general subject, covering a large number of factors, some of which affect only pressure-feed systems, and others are common to both pressure and splash systems. At the General Motors proving ground a number of cars of all makes are always under test. The records show that, as a class, cars having pressure lubricating systems are worse in oil consumption than those having splash systems, and that oil consumption increases with engine wear with both systems after the first few thousand miles, although it may improve with wear while the piston rings and other engine parts are wearing in.

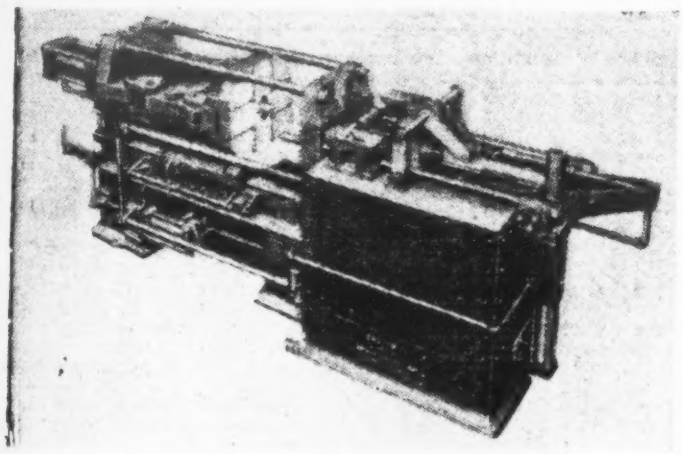
A number of years ago Round and Bull showed that oil consumption was increased by factors that permitted more oil to be thrown on the cylinder walls and that consumption was decreased by factors that permitted the oil to drain or be scraped from the walls. The amount of oil thrown on the cylinder walls increases with speed, for the reasons already given. Increasing pressure on the piston rings decreases oil consumption at high speed and also decreases oil consumption at low speed. This combination of high ring pressure with decrease of oil on the cylinder walls at low speed may result in undesirable cylinder wear. For this reason engineers are afraid to go to extremes in trying to control oil consumption by means of piston rings. Small clearances between the piston and cylinder decreases oil consumption, especially at high speed, where the piston rings cannot follow the cylinder wall.

Air cleaners and oil filters are valuable in decreasing oil consumption in that they decrease the quantity of dirt in the oil and thus decrease wear. Under some conditions, water on the cylinder walls and bearings causes rust and rapid loss of metal. High percentages of sulphur in the fuel aggravates this condition. Too low jacket-water temperature (below 110 deg. F.) permits contamination of lubricating oil by condensed water and aggravates this trouble. The passage of insufficient amount of air through the crank case ventilators makes them less efficient and increases the trouble. Dirt introduced because of improper cleaning of the air entering the ventilator also aggravates the trouble. An oil cooler or temperature regulator with proper thermostatic control of the jacket-water temperature permits

(Continued on Page 10)

Production--Engineering--Factory

Reed Die-Casting Machine Operates Hydraulically



REED-PRENTICE model 7F die-casting machine

The model 7F die-casting machine is a new machine made by Reed-Prentice Corporation, Worcester, Mass., designed from the model 7.

The new machine is hydraulically operated throughout. Two levers are provided at the right side of the machine, one to operate the oil mechanism and the other the air.

The die plates are machined with T-slots, allowing the dies to be mounted quickly in position. An automatically operated hydraulic cylinder can be furnished for ejecting the castings from the dies. Automatic removal of cores during the opening stroke of the machine can also be provided for.

The hydraulically operated gooseneck is automatically submerged in the metal, allowing it to fill up to a predetermined level. The cylinder for bringing the gooseneck up to position is mounted on the end of the machine, and is operated by a lever convenient to the operator. When the gooseneck is in position, the air connection through the ball and socket is brought into position automatically and is then ready for the operator to apply the air through a second lever.

Specifications: Die opens, 8 inches; maximum die space, 17 inches; minimum die space, 6 inches; between bars, 16½x12 inches; shots per hour (average), 250; gooseneck capacity (aluminum), 7.5 pounds; pot capacity (aluminum), 250 pounds; length, 10 feet 8 inches; height, 50 inches; width, 42 inches; shipping weight, 6,500 pounds.

NEW LITERATURE

The Automotive Daily News will publish announcements of new literature of interest to its readers. The booklets may be obtained free of charge by ordering them by number from the Technical Editor, Automotive Daily News.

A-12—New catalogue of garage equipment.

A-13—Visual drum gauge handbook on brakes.

A-14—Wheel aligner manual.

A-15—Use of nickel alloy steel in aircraft engine construction.

A-16—Catalogue of air compressors.

A-17—Instructions for adjustments and lubrication of worm and roller steering gear.

A-18—Catalogue of tire inflators and air compressors.

A-19—Booklet on weldless chain and attachments.

A-20—Co-operative plan of merchandising accessories.

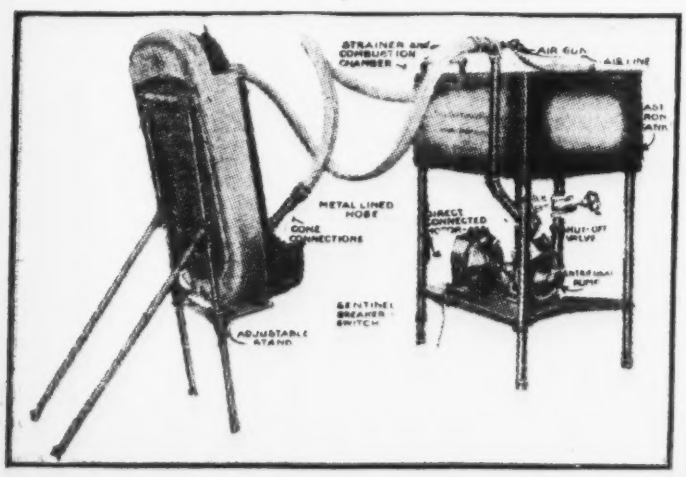
WAR DEPARTMENT ORDERS 156 WRIGHT CYCLONE ENGINES

Paterson, N. J., June 18.—Guy W. Vaughan, president of the Wright Aeronautical Corporation, announces contract received from the United States War Department for 156 Wright Cyclone engines of 575 horse power. This contract totals $1,026,646.41.

HOYT MAKES RADIATOR WASHER AND SOLVENT

A radiator washer and a new solvent solution for removing dirt, grease and incrustation caused by hard water impurity, etc., has been introduced by the Hoyt-Beardsley Manufacturing Company, Sioux City, Iowa.

The illustration shows the use of the washer with radiator removed from the car. However, the complete cooling system, including the cylinder block, may be cleaned in place. The washer includes adjustable stand, fifteen-gallon cast iron tank, braker switch, centrifugal pump of thirty-five gallons per minute capacity, one-fourth horse power 110-volt, sixty-cycle, single phase electric motor as standard equipment, with the selection of different voltage motors at no extra cost. Metal-lined hose and fittings. The washer sells at $185. The solvent solution in ten-gallon drums sells at $15.



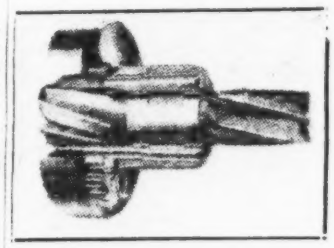
HOYT-BEARDSLEY radiator washer

ALDEN STATES NEED FOR TRANSPORTATION ENGINEERS

Dettroit, June 18.—There is an urgent and rapidly increasing demand for local-transportation engineers throughout the country, and concerted effort should be made by educators to meet this need, said Herbert W. Alden, chairman of the board of the Timken-Detroit Axle Company and a member of this city's Rapid Transit Commission, in an address here.

"Leading colleges should incorporate a special local-transportation engineering course in their curricula to prepare young men for this vitally important field," Mr. Alden said. "Local transportation is no longer a traction problem, involving merely electric surface and elevated lines. It now also includes operation of motor and trolley bus carriers, proper location of tracks in streets and most convenient routes in population centers to serve the masses safely and speedily, synchronization of traffic signal system, and reduction of vehicle noises. In fact, local transportation has become so wide in scope that highly specialized experts are needed to solve the many and varied engineering problems involved. A number of municipalities have been compelled to call upon engineers of large corporations in their cities to help untangle their local transportation problems, due to the lack of specially trained men qualified for this work."

DOUBLE - END MILL FEATURES DOUBLE SERVICE



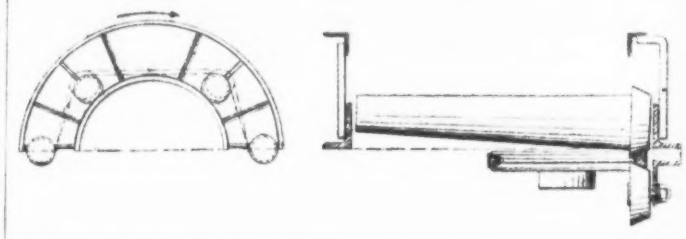
THURCO double-end mill, chuck and collet assembly

Double-end mills which feature double service are announced by the Thurston Manufacturing Company, Providence, R. I. If one end requires regrinding or is broken, the tool is quickly reversed and the operator proceeds with his work. A special chuck holds the mill positively and eliminates slipping under the heaviest feeds and speeds. These chucks are made in three types as follows: S-1 for small accurate jobs, S-3 for medium or fair-sized milling, and S-5 for heavy or rigid milling. The chucks are standardized for the use of various collets, and all mills are interchangeable. Capacity is based on the size of the chuck, which is made so that it can be mounted directly on the nose of the spindle in the milling machine, and held by four studs, which are driven by two large keyways. The chucks have a centralized tightening device at the front, which allows the operator to tighten the mills quickly when making changes without loosening draw bolts.

BEAN CHIEF ENGINEER OF BROWN INSTRUMENT

Philadelphia, June 18.—R. D. Bean, formerly manager of the engineering development department of the Brown Instrument Company, Philadelphia, has been made chief engineer of that company. Mr. Bean's extensive field investigations covering many applications of Brown industrial measuring instruments have won him wide acquaintance and his numerous friends will be glad to hear of his promotion.

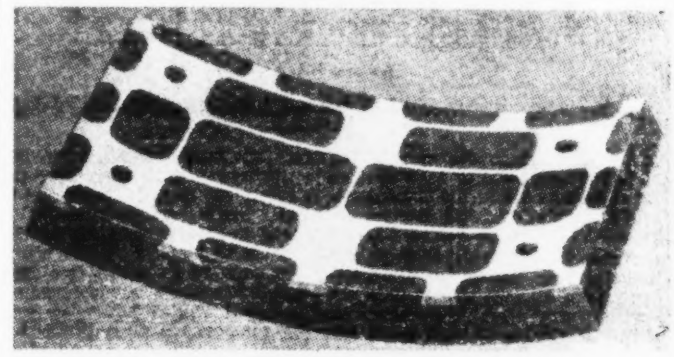
'Standard' Applies V-Belt Drive to Conveyor Curves



(Left) "STANDARD" V-BELT driven 180-deg. live-roller curve. (Right) Cross-section of V-belt showing the two bevel-faced idlers and V-belt sheave

Application of the V-belt drive to a live-roller curve has been made by the Standard Conveyor Company, North St. Paul, Minn. This type of drive makes every roller in the curve power driven. Two bevel-faced idlers, one attached to the roller and the other idling, form the grove in which the V-belt travels. The V-belt drive also assures quiet operation. Both 90 and 180 deg. live-roller curves can be installed, it is claimed.

Alloy-Grid Brakeblok Backing Plate



NEW alloy-grid brakeblok backing plate

A new development in Brakebloks is announced by the American Brake Materials Corporation division of the American Brake Shoe and Foundry Company, Detroit Mich. It consists of an improvement in heavy-duty brake material design, a new alloy-grid backing plate built into bolt-on Brakebloks. It is claimed to give greater thickness of usable brake material and increased mileage, as well as greater braking efficiency. It is also said to be stronger than composition backing, and to provide more firmness and durability of anchorage. The design, it is said, moves the bolt head farther from the drum and assures better contact between the back of the Brakebloks and the face of the drum.

PLYMOUTH PRESENTS CUTAWAY CHASSIS TO 5 TECHNICAL SCHOOLS

Five cutaway chassis, used for demonstration and displaying purposes at the National Automobile Shows were presented to the engineering departments of as many well-known technical schools last week by Plymouth Motor Corporation, according to an announcement made today.

The schools receiving these chassis include Alabama Polytechnic Institute, Colorado Agricultural College, University of Missouri, Clemenson Agricultural College and Agricultural and Mechanical College of Texas.

JOYCE ELECTRICALLY OPERATED HYDRAULIC LIFT ANNOUNCED

The new style "E" electrically operated hydraulic lift is announced by the Joyce-Cridland Company, Dayton, O. The electric driven pumping unit is mounted on the oil reservoir and the operation of the lift is controlled by foot valves. When the lift reaches its upper limit, or the foot valve is released, a pressure switch stops the motor automatically. The lift is lowered by holding open the lowering foot valve and permitting the oil to return to the reservoir. The lift can be stopped instantly in either direction by releasing the foot valve. Three types of superstructure are available. Standard motors 220 volt, 3-phase, 60 cycle motors for other currents can be furnished at extra cost. The electrical pumping unit is furnished assembled and installation is completed by running the wiring to the starting switch and completing the piping beyond the pumping unit to the lift or lifts. Two or more electric lifts may be operated from a single pumping unit. The lifts can be furnished with jacking units having 9½ or 10½ inch diameter pistons.

CHAIN PRODUCTS DISTRIBUTES TIO-MA REFINING PRODUCTS

The exclusive distribution of the automotive products formerly marketed by the Tio-Ma Refining Corporation of Cleveland, O., known as Tio-Ma Magic Oil and Tio-Ma Spraying Equipment has been secured by the Chain Products Company. The oil has now been given a discriptive name, Hodell Limberoil.

All existing sales franchises obtaining with the Tio-Ma Refining Corporation will be honored by the Chain Products Company.

NEW HIGH-SPEED TOOL FOR DRILLING CONNECTING RODS

Pratt & Whitney Company, Hartford, Conn., has developed a high speed machine tool for drilling a long hole through automobile connecting rods, adapting the methods used to drill rifle barrels. This new tool makes it possible to provide any automobile with pressure oiling at small additional manufacturing cost, it is claimed.

Low-Temperature Starting

(Continued from Page 8)

by the different combinations of equipment shows a wide variation. As will also be noted from the curves in both Figs. 1 and 2, the current draw is less and the voltage at the starting motor as well as at the ignition is greater in the case of the back-geared starting-motor tests.

Engine-Cranking Horse Power and Determination of Starting-Motor Gear-Ratio

From the data collected during the cranking-speed tests the horse power required to crank the engine at the various speeds in the cranking range can be determined. If several different starting-motors and batteries are to be considered and the performance curves of each motor with each battery are available, we can select the ideal gear-reduction and predetermine to a very close degree of accuracy the cranking speed that each combination will give.

As previously stated, the torque of a series-wound starting-motor

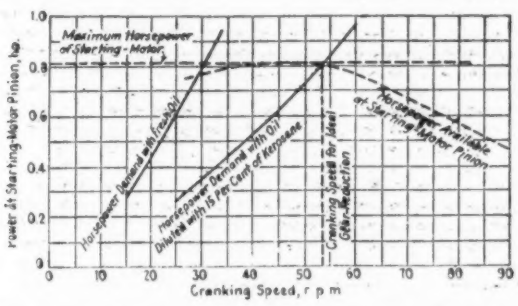

Maximum Horsepower of Starting-Motor
Horsepower Demand with Fresh Oil
Horsepower Demand with Oil Diluted with 15 Per Cent of Kerosene
Cranking Speed for Ideal Gear-Reduction
Horsepower Available at Starting-Motor Pinion
Power at Starting-Motor Pinion, hp
Cranking Speed, r p m

FIG. 3. Horse power required to crank eight-cylinder engine at 0 degrees Fahrenheit

is proportional to the current; so, if the starting-motor is calibrated on a dynamometer for the torque-current relation, the torque in pound-feet can be substituted for amperes in the table of data collected during the engine cranking-speed test, and with these data the horse power that is required to crank the engine at each speed can be computed in terms of starting-motor demand. If the actual engine-cranking horse power is desired, the starting-motor torque as used above must be multiplied by a factor to allow for loss in the gearing between the starting-motor and the engine.

To determine the best gear-reduction, knowing the loss in the gears is not necessary. The horse power required to crank the engine as computed from the formula is plotted against engine-cranking speed as shown in Fig. 3. From the starting-motor dynamometer test we observe speed and torque at the starting-motor pinion for different current values, using for each run a voltage at the starting-motor terminals which is equal to the 0-deg. 5-sec. discharge voltage of the battery minus the line loss on the car. From these data we compute the horse power available and plot the complete performance curves of the starting-motor. For accurate work the starting-motor should be tested at 0 degree Fahrenheit, or the normal temperature test results should be corrected to that temperature by calculation, as has been done with the curves reproduced in Fig. 4. From the starting-motor horse power curve we determine the maximum horse power available and transfer it to the engine-cranking horse power-demand curve.

The intersection on the horse-power-demand curve will indicate on the base line the maximum cranking speed that can be expected from the starting motor and battery under consideration. This speed is divided into the speed of the starting motor at the point of maximum horse power (see Fig. 4) and the result is the ideal gear ratio for best cranking under the condition adopted. With a direct geared starting motor, the range of gear reductions available is rather limited and, even with back geared starting motors, adopting the ideal ratio is not always commercially practical. However, if the checks as outlined were made on all engines, I am very sure that better winter cranking speeds would result, with less drain on batteries, and at the same time give us higher voltage at the ignition.

In Fig. 5, curves showing the relation between 0 degree Fahrenheit cranking speeds and piston displacement are plotted for five six-cylinder engines of similar design and approximately the same compression ratio. The tests on these engines were not all made at the same time and actually extended over a period of a year. The same size of battery was used in each case. One curve shows the cranking speeds, using a starting motor in which only two poles were provided with field coils. The other had four poles wound.

From the great volume of cranking data that has been accumulated in our laboratory we can say in general that

1. The larger the engine, the more is the problem of winter cranking.
2. For any given starting motor, increasing the size of the battery will not add greatly to cranking speeds, but will materially increase cranking capacity.
3. The cranking speed of an engine may vary over very wide limits, depending on the type of starting motor and gear reduction used.

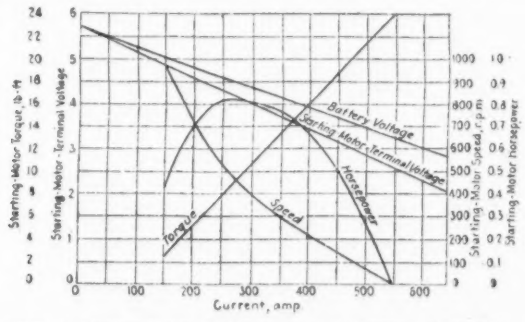


FIG. 4. Starting-Motor Performance at 0 Degrees Fahrenheit
These curves are for a back-geared starting motor and a seventeen-plate battery, the same as in Fig. 3. The resistance of the starting motor was 0.0047 ohms and that of the starting-motor circuit was 0.0012 ohms.

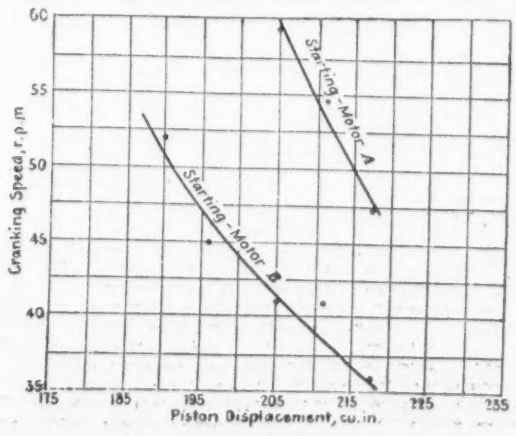


FIG. 5. Relation Between Cranking Speed and Piston Displacement
These curves present a comparison of cranking speeds for five six-cylinder engines of similar design and approximately the same compression ratio. Both starting motors were of the direct-geared type, with a gear reduction ratio of 9.115. A thirteen-plate battery was used in all tests, which extended over a period of one year. Starting motor A had four poles wound, while starting motor B had field coils on only two poles

Starting Motor Control Mechanism

Starting motor control mechanisms as used today can be divided into three general classes which (a) automatically engage and disengage the starting motor pinion, (b) manually engage and automatically disengage the pinion or (c) manually engage and disengage the pinion and have an over-running clutch that releases the armature in the interval between the time when the engine starts firing and the manual disengagement of the pinion.

Without entering into a discussion of the relative advantages and disadvantages of the three types of control, I will say that our experience has left no doubt in our own minds as to the superiority of the third type so far as the winter starting problem is concerned, particularly on the larger engines.

Ignition systems now on the market are well standardized in design and, without exploring the field of the unconventional, the automobile engineer has very little choice in his selection of ignition equipment. While the importance of good ignition for winter starting cannot be overlooked, we can say without great fear of contradiction that almost any standard ignition system on the market will fulfill the requirements for winter starting, provided it is in good condition. In other words, the servicing of the ignition system is the limiting factor as regards starting. Intensive research on the part of the ignition engineer, however, is needed to develop ignition that will not require frequent servicing.

In our laboratory we always test the ignition system for performance at 3 volts, to be sure that a suitable spark is available for winter starting. However, as the points become oxidized or pitted, the resistance across them increases, so that a higher primary voltage is required to give the same performance. This is another reason why we try to work out our starting-motor and battery equipment to give the highest possible voltage at the starting-motor terminals.

The ignition system very properly includes the spark plugs and their correct selection and has a very important bearing on winter starting.

Our method of selecting spark plugs is to adopt one that will not break down from preignition when operating for ten minutes in the engine under full load at 2,000 r. p. m. with the cooling water at 200 degrees Fahrenheit and the spark advance 50 per cent. above normal, but will break down under the same condition with the spark advanced 75 per cent. above normal for that speed.

At the conclusion of the low-temperature cranking tests and the dynamometer tests for selecting spark plugs and ignition timing, the electrical units are decided upon and released and the test engine equipped accordingly. The engine is then ready for actual starting development, which is mainly a question of designing the carburetor to give the correct air-fuel ratio under starting conditions and the best possible degree of atomization.

The engine is started twice a day for several days. At the beginning of the starting tests the engine is filled with fresh oil and, as a result, the cranking speed is slow. Dilution increases for each successive start and, consequently, the cranking speed increases. When the speed becomes too high, the oil is replenished with fresh oil.

Prior to each starting test the engine is cranked over four revolutions to check the cranking speed. The distributor cap is removed and two revolutions of the distributor rotor are timed with a stop-watch. The intake-manifold vacuum chart also indicates the cranking speed. During the cranking-speed test, the recording voltmeter ammeter checks the cranking current and starting-motor voltage. During the cranking-speed check the carbureter is dry, so that gasoline will not be drawn into the engine. Following the cranking check, the carbureter float bowl is filled from a gravity tank. The engine is then ready to start. The manual choke control is closed, the throttle set about one-third open and then the starting-motor pedals is depressed. A stop-watch is snapped and the recording vacuum gauge started by a remote-control switch simultaneously with the depressing of the starting-motor pedal. The starting motor is kept engaged until the engine is running on its own power. The stop-watch indicates the time required to start, and the vacuum-gauge chart gives a further check. After the engine is started it is allowed to idle at about 500 r. p. m. until the cooling-water temperatures reaches 160 degrees Fahreinheit. The gasoline is them shut off and the float bowl drained.

All cranking and starting data are recorded in the center space of the vacuum-gauge chart, and these data, together with the vacuum curve, give a permanent record of each start. When several starts have been made, a curve is plotted, as in Fig. 6, showing the relation between the time required to start and the cranking speed.

From the cranking-speed tests made with undiluted and 15 per cent. kerosene-diluted oil, we take the cranking speed to be expected from the engine and plot vertical lines through these speeds on the starting time curve. Their intersections will give the time required to start the engine at 0 degrees Fahrenheit with the actual equipment as released.

If the carburetor we start with does not give a satisfactory starting curve, it will be modified When the best combination is finally determined, the full-choke starting air and mixture quality curves are written into the carburetor specifications.

In recent months we have devoted considerable research to the problem of getting a higher degree of atomization in the gasoline mixture delivered to the manifold and, experimentally, have been able to reduce the starting time 50 per cent. As this phase of development is still in the experimental stage, it cannot be discussed at this time.

Experience in developing carburetor mixture ratio for winter starting has indicated that a reasonably definite mixture must be supplied for each engine if the best starting results are to be obtained. While the mixture ratio will vary with different engine designs, the variation for the engines that we have tested does not cover a very wide range. This leads to the belief that, in terms of the actual vaporized mixture in the combustion chamber, a single definite mixture ratio exists, which, if possible to secure, would give the best winter starting results in all engines, just the same as applies in the case of a warmed-up engine running under full load.

Today's S. A. E. Program

FRIDAY, JUNE 19

10.00 A. M. Auditorium

ENGINES

G. C. Brown, Chairman

Oil Control in the Engine—H. C. Mougey, General Motors Corporation

Winter Starting Tests—P. J. Kent, Chrysler Corporation.

Reduction of Fan Noise and Fan Power—A. D. Gardner, Automotive Fan and Bearing Company.

Problem of Oil Consumption

(Continued from Page 8)

rapid warm-up of the oil and thus helps crank case ventilation and decreases the trouble due to water. An oil cooler also reduces oil consumption by limiting the maximum oil temperature, thus limiting the value to which the viscosity can drop.

All lubricating systems are subject to a greater or less delay in oil being delivered to bearings and cylinder walls on starting, although in splash-feed systems residual oil in the troughs may provide lubrication during this period. This delay may result in rapid wear of bearings and other parts, thus rapidly increasing the oil consumption.

Becker, in a paper on cold starting of engines, gives data in regard to the length of time required for oil to be delivered to the bearings at low temperatures with oils of different viscosities and pour tests. From the data it is apparent that the use of oils that are too high in viscosity or in pour test, or both, results in little or no lubrication of the engine on starting, and the periods of time that this insufficient lubrication condition exists may be quite long.

Many patents have been granted for means of delivering oil directly to the cylinder walls under pressure immediately on starting, instead of allowing it to leak past the connecting-rod bearings and be thrown on the cylinder walls. Clayden suggests introduction of oil into the intake manifold by means of an automatic device that operates only on starting, and many other upper cylinder oilers feed oil into the intake manifold and operate both during running and starting conditions. It is much simpler to obtain upper cylinder lubrication when needed by maxing a small quantity of oil in the gasoline. Since we are trying to decrease oil consumption at high speed, this addition of oil to the gasoline is not a solution of the problem, but with new cars, driven only at slow speeds during the run-in period, it may be very valuable. A system of splash lubrication, on starting, from troughs full of oil, together with regular pressure lubrication after normal running conditions have been established, is another of the suggestions to solve this problem.

In some cases, changes in the oil pump inlet systems to shorten this initial period of insufficient lubrication involve means of by-passing the oil screen if it offers too much resistance to flow of the cold oil. Floating oil inlets have been adopted by some companies and various other devices have been used by others.

To help in getting oil to the cylinder walls at low speeds, spit-holes are frequently drilled in the connecting-rod bearings, but they are much more effective at high speed than at low speed, and thus they increase oil consumption at high speed. Variations in end clearance and in diameter clearance of connecting-rod bearings affect oil consumption, and, if these clearances are depended upon to meter the amount of oil thrown on the cylinder walls, this amount will increase as the bearings wear. In some cars this change due to wear is provided for by metering the oil at the crankshaft by regulating the size of the hole where the oil enters the connecting-rod bearing and then providing a free outlet at the bearing by suitable grooves and slots. With such a system, wear of the connecting-rod bearings does not cause an increase in the amount of oil that flows through bearings and is thrown on the cylinder walls. Baffles to limit the oil thrown on the cylinder walls have been tried, but the rapid air movements initiated by the pistons greatly interfere with this effect.

Some automobile companies try to control oil consumption by working on the registry of the lubricating grooves on the main bearings.

(Continued on Page 11)

Oil Consumption

(Continued from Page 10)

Trouble is experienced due to insufficient lubrication at low speeds and the oil pressure is then increased to cure this trouble. The resulting over-lubrication at high speeds is then remedied by again decreasing the length of the oil groove.

Tests were started in our laboratory to try to control oil consumption by controlling the oil pressure. It was soon found that there was a limit below which decrease in oil-pump pressure had little effect, because the crank shaft acts as a centrifugal oil pump in series with the regular oil pump, and at high speed it will develop quite high pressures if it is supplied with oil.

A very old idea is to lubricate the main bearings by pressure and then depend more or less on the centrifugal-pump action of the crank shaft to lubricate the connecting rods with leakage from the connecting rods supplying the cylinders.

The problem of oil leaks must be solved before oil consumption is controlled. This is true, regardless of the lubricating system used. For many years the Skinner system has been used to suck oil off the cylinder walls and thus improve oil consumption. The use of a very similar system for this purpose is mentioned by Round. By applying suction to the entire crank case or to the individual areas where leaks accur, it appears that the troubles due to leakage can be overcome. Of course, all unnecessary leaks, such as those at the joints of the crank pan and crank case and the like, should be stopped by better construction or maintenance, or both.

Viscosity of the Oil

There are some things that the oil companies can do to help. As regards the oil, the principal properties in the order of their importance are viscosity, volatility, pour test and possibility of effects from carbonization of the oil-control rings.

High viscosity decreases the amount of oil thrown on the cylinder walls and oil lost by leakage. Although an increase in oil viscosity decreases the amount of oil thrown on the cylinder walls, it increases the difficulty of oil removal or oil drainage from the cylinder walls. Where these two opposed factors cross is the maximum gain in oil consumption due to increased viscosity. Further increases in oil viscosity give decreased miles per gallon.

Oil viscosity is of such great importance on account of the unavoidable changes in viscosity, due to the temperature range to which the oil is subjected. For summer driving conditions the oil-temperature range is less than for winter-driving conditions, especially with cars fitted with shutters, and for this reason the changes in viscosity in winter cause more trouble than in summer. The minimum oil temperature corresponds with the minimum atmospheric temperature. As previously shown, the viscosity of the undiluted oil at the minimum atmospheric and oil temperature must not exceed about 50,000 Saybolt sec. to allow cranking the engine when cold. The extreme temperature ranges in winter between low atmospheric temperature and high oil temperature with oils not over 50,000 sec. at zero or sub-zero result in oil of very low viscosity at high temperature, thus greatly increasing oil consumption at high speeds, due to low viscosity.

Crankcase dilution helps in reducing the viscosity of the oil on the cylinder walls at low temperatures, thus making the value of 50,000 sec. for the undiluted oil in the can a possibility for cold-starting. However, dilution is not a complete solution of the problem, since driving at high speeds and temperatures removes dilution, thus raising the viscosity of the oil and making cold-starting the following morning difficult or impossible. Proper use of the oil-temperature regulator, by limiting the maximum oil temperature and thus limiting the minimum oil viscosity when hot, increases the miles per gallon of oil as well as permits the use of a lighter oil when cold, thus improving cold-starting conditions.

Oil consumption is increased by bearing wear or pounding out of babbitt bearings or flow of thick babbitt bearings resulting from high loads at high temperatures. Although the invention or development of bearings that will resist pounding out or wear at high temperatures will be a solution of this part of the problem, the bad oil consumption due to low-viscosity oil resulting from high temperatures will remain. Thus, change in bearing composition is not a complete solution of the problem, unless it is accompanied by changes in the lubricating system, to give good oil consumption with light oil.

The greatest possible change that oil companies can make in viscosity-temperature slope between oils of extreme differences in crudes and in refining methods is approximately 15 degrees Fahrenheit for 100 degrees temperature range for oils matched as to viscosity at 100 degrees Fahrenheit, using oils of viscosity ranges that are possible for cold starting.

Volatility of the Oil—Volatility of the oil increases oil consumption at high temperatures. This effect is well known. The following comments are taken from the Tide Water Oil Company's book on Veedol published in 1920:

"If a lubricating oil contains a large portion of low-boiling-point constituents, the loss of oil vapors will be proportionately high when it is used in an engine, and vice versa. Some loss will always occur, but the choice of the right oil will reduce such needless waste to a minimum and be a guarantee of a reasonably low specific consumption, good lubrication and practically carbon-free conditions within the explosion chambers. The degree of volatility which lubricating oils should have is entirely determined by the maximum operating temperatures of the engine and by the character of its load, full or variable."

According to our tests, this difference in volatility of oils of normal composition is of little or no effect if the crankcase-oil temperature does not exceed 170 degrees Fahr. The effect of volatility increases as the maximum oil temperature and the volatility of the oil increase.

Pour Test—Pour test affects oil consumption by its effect on the wear of the engine. Oil that is more than a few degrees below its pour test does not flow to the pump inlet, since the viscosity of the oil below its pour test, when measured under low pressure such as that which caused the oil to flow to the pump inlet, is very high. The rate of flow of a certain oil through the Saybolt viscosimeter, measured at several different temperatures and pressures, is shown in the following table.

Table 2

The lubricant used in this test was a commercial lubricant bought under the name of spindle oil. It had the following properties:

Spe. Gr. at 60 Deg. F.	0.897
Visc. at 0 Deg. F. sec.	6000
Visc. at 80 Deg. F. sec.	225
Visc. at 100 Deg. F. sec.	135
Visc. at 130 Deg. F. sec.	82
Visc. at 210 Deg. F. sec.	43½
Pour Test, deg. F.	35

The lubricant was tested for rate of flow in a Saybolt universal viscosimeter to determine the effect of an additional head produced by a column of kerosene. The following results were obtained.

Additional Head in Kerosene	G'ms delv'd per min. at 36 Deg. F.	25 Deg. F.
0	1.3	0
5	3.3	0
10	5.3	0.04
15	7.3	0.41
20	9.3	0.44
25	11.4	0.47

It will be noted that when the lubricant was 10 deg. below its pour point it actually flowed in the Saybolt universal viscosimeter with an additional head produced by only 10 in. of kerosene.

Possibility of Effects From Carbonization of the Oil-Control Rings—As previously pointed out, oil-control rings are designed to help in removing oil from the cylinder wall. There is a possibility that carbonization of oil-control rings, with blocking of the holes and oil slots and sticking of rings in the piston grooves, will decrease the effectiveness of the rings, thus increasing oil consumption. This possibility seems very reasonable, but there are very few real data on this subjct or on the relation of physical and chemical properties of the oil to the possibility of formation of carbon in the rings. Temperature and rate of oil-flow appear to be more important than chemical properties of the oil. Formation of carbon in the rings and ring grooves is very greatly decreased by better cooling of the piston and rings. Increasing the flow of oil through the holes and clearances of the piston rings tends to wash out the carbon as it is being formed and thus to decrease the formation of carbon in the oil-control rings.

Length of Time Between Oil Changes—The length of time that is desired between oil changes is one of the questions on which there is a difference of opinion. If an engine should show 3,000 miles per gallon on a test and require 6 quarts of oil to fill the crankcase, and if the crankcase should be drained every 500 miles and fresh oil put in, the oil consumption of this car would be 6 quarts per 500 miles, or 333 miles per gallon, instead of the 3,000 miles per gallon as shown by the test.

The effect of oil changes is of less importance when high-speed operation of the engine is considered. This same engine previously described, which is assumed to have shown 3,000 miles per gallon on the test, may show only 300 miles per gallon or less when it is operated at speeds over 55 m. p. h. At speeds of 60, 65 and 70 m. p. h. the miles per gallon may be much less. Any ordinary frequency of oil drainage would have little effect on the amount of oil consumed under these conditions.

When the car is driven at high speeds at which high oil consumption is to be expected, the car owner should try to maintain the crankcase level at the "full" mark instead of letting the level get low on the assumption that in a short time the crankcase will be drained and the oil in it discarded. In most cases when the oil is a factor in burned-out bearings, it is an absence of oil of any kind rather than the properties of the oil that was NOT in the bearings.

One serious objection to draining the crankcase oil, especially in the winter, is the difficulty that is likely to be encountered by having oil of too high viscosity in the engine for cold starting. Oil in use has a percentage of dilution, and even 10 per cent, in an oil of ordinary viscosity required for winter driving will decrease the viscosity at 100 deg. F. to about one-half. If the crankcase is drained and an oil which is not prediluted is put into the engine this oil, before it becomes diluted by service, may have a viscosity so great that it will make starting difficult or impossible. In addition, on account of its high viscosity, it will make the establishment of lubrication after cold starting very slow.

S. A. E. REPORTS ON DEVELOPMENT OF SUPERCHARGERS

One of the most important pieces of research work now being conducted by aeronautic members of the Society of Automotive Engineers is that having to do with the improvement of superchargers.

Investigations pursued at the Langley Memorial Aeronautical Laboratory include four types, the vane, Roots, the turbine-driven centrifugal and the gear centrifugal. For critical altitudes below 20,000 feet a maximum difference of about 6 per cent. exists between the amounts of net engine power developed by superchargers of the various types, when ideal methods of control are employed, but for critical altitudes above 20,000 feet an engine develops considerably more power when equipped with a turbo-centrifugal supercharger than with any other type. The Roots type gives the lowest net engine power of all at high critical altitudes, because it has the least efficient type of compression.

The throttling method of control used on the geared centrifugal type is very satisfactory at low altitudes from a net engine power standpoint when compared with the method used on the Roots or turbo-centrifugal types.

CLASSIFIED ADVERTISEMENTS IN THE AUTOMOTIVE DAILY NEWS BRING RESULTS

Gardner's Analysis of Fan H. P. and Noise Problems Comprehensive

Principal Factors in Fan Design Discussed and Results of Tests Profusely Illustrated in Charts; Detailed Summary of Conclusions Resulting From Study Presented

The following is an abstract of a paper to be presented today by A. D. Gardner, chief engineer Automotive Fan and Bearing Company, Jackson, Mich., at the summer meeting of the Society of Automotive Engineers, White Sulphur Springs, W. Va.:

Increase in automobile engine size nd engine output has increased the demands on the cooling system. The radiator core must possess greater heat-dissipating capacity. The fan must supply more air. Power must be conserved to maintain car performance. As other engine noises have been greatly reduced, the fan has justly been criticized as being outstandingly noisy. Drastic steps taken in some cases to reduce fan noise have also reduced the cooling capacity. Hence the problem is to deliver more air, decrease fan horse power, reduce fan noise so that it is comparable with or less than other power plant noises and install the fan in a restricted space.

Hundreds of odd-shaped fans have been invented to solve this problem. Many ingenious devices for reducing fan horse power and noise at the higher speeds, such as cut-outs, slipping clutches, double blades and the like, have been patented. Numerous attempts have been made to apply theories of airplane propeller design to cooling fans, but it is not certain that the conditions of operation are sufficiently alike to permit this adaptation. So long as fan blades must be made of thin-section sheet-metal stampings to be sold at prices which car manufacturers are willing to pay, the use of the propeller-type cooling-fan probably will be limited. The need is for a thorough investigation into the behavior, on and off the car, of the types of fan now in use and a consistent program of research and development aimed at their improvement.

The author describes the testing apparatus and method used in making the investigation. Graphic charts showing the results of tests are provided. These cover the relationship between air flow and fan speed for three medium size fans having respectively two, four and six blades; fan speed and horse power curves for these fans; relationship between fan speed and air flow per unit horse power; pressure drop through the radiator core plotted against fan speed; relation between air output and fan diameter; relationship between horse power and diameter for a four-bladed fan; efficiency diameter chart for a four-bladed fan; relationship between air flow and projected width for a four-bladed fan; variation of horse power with projected width for the same fan.

Other charts include efficiency versus projected width; relationship between fan blade curvature and air output, horse power and efficiency for a four-bladed fan at 3,500 r. p. m.; air output, horse power and cubic feet of air per horse power plotted against angular spacing of blades for a four-bladed fan at 3,000 r. p. m.; blade width versus projected width for a four-bladed fan at 2,500 r. p. m.; horse power consumption of a four-bladed fan having blades three inches wide compared with one having blades four inches wide; relationship between cubic feet per horse power and projected width for blades three inches and four inches wide respectively, for a four-bladed fan at 3,500 r. p. m.; discharge characteristics for a four-bladed fan; pitch of fan sounds, and effect of angular spacing of blades on relative intensities.

Summary

The tests, according to the author, represent only a very slight beginning in the considerable amount of research and development work which is necessary to develop cooling fans to the point at which their characteristics are thoroughly understood and the maximum airflow can be attained with minimum horse power and the least noise.

The following conclusions may be drawn:

Air output increases directly as fan speed.

Horse power increases at a rate slightly less than the cube of the fan speed.

The fan should be driven as slowly as possible, the lower limit being determined by low speed, full-throttle cooling-requirements. Best practice indicates a ratio not higher than 1.1 with the crank shaft.

Four-blade fans possess advantages over either two or six blades, for all except the larger installations.

The pressure drop across the core on the suction side of the fan varies at a rate slightly below the square of the fan speed.

Experience indicates the advisability of using as large a fan diameter as is practicable. Some of the theoretical considerations are at variance with this practice.

For low air outputs, efficiency is increased by increasing the projected width and reducing the speed. For high outputs the efficiency is appreciably less than for low outputs, but its value may be increased by decreasing the projected width and operating the fan at a higher speed.

The so-called spiral type of fan blade has proved to be very efficient.

The flat blade is very efficient, but it lacks air output. On the other extreme, too abrupt blade curvature defeats its own purpose, since the air will not follow the sudden changes in direction of the surface.

Fan blades should be as wide as practicable to attain highest efficiency and minimum noise. For automotive installations, four inches is about the maximum width. Blades wider than four inches tend to vibrate and flutter.*

In adapting the fan to the car, as many as possible of the desirable characteristics should be retained. This can be accomplished in part by high mounting, free air xits from the engine compartment, properly located louvers, fairly positive fan drive, ample clearance with stationary parts and about ⅝ to ¾ inch clearance from the radiator core.

Fan noises can be definitely locaetd on the music l scale. They have frequencies of NS/60 vibrations per second, where N is the number of blades and S the fan speed in revolutions per minute.

The frequency of the fan sound depends on the number of blades and the speed. The loudness depends on the tip speed, other things being equal.

Fan noise can be reduced by the means discussed. It can be blended in with other engine noises by varying the angle between the blades, which varies the proportion of four-blade whine and two-blade roar.

To obtain the best results for any given installation, run the fan as slowly as possible with as few—usually four—wide, flat blades of slight projected width as possible and have the diameter as great as is practicable. To obtain more air, increase the projected width, or the width or the curvature. Increase the speed only as a last resort.

IOWA COMPANY GETS ORDER TO MAKE 50,000 CAR HEATERS

Fairfield, Iowa, June 18.—The Dexter Washing Machine Company is to keep its plant in production for some time to come, as the firm has received an order for the manufacture of 50,000 automobile heaters.

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Automotive Daily News is the only publication in the automotive field giving news service each day during the S. A. E. meeting.

This publication in its June 13th issue, distributed at the meeting on June 14th, gave the names of those in attendance, *the only publication* to do so. The June 15th issue contained additional names of those in attendance, together with the papers to be read on June 15th. The June 16th issue contained the verbatim discussions of the day preceding, sports results and other news from White Sulphur. First photographs from the meeting appeared in the June 17th issue.

Before the week is past Automotive Daily News will have published not only all the worth while spot news but the papers as well. Engineers, production men and other factory officials, automobile dealers and other executives of importance want all information as quickly as possible.

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